Development of a Tournament Preparation Framework for Golf

A Doctoral Thesis

by

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Submitted in fulfilment of the requirements for admission to the degree of Doctor of Philosophy

Victoria University

Institute for Health & Sport

June 2019

ABSTRACT

Understanding of the behaviours important for preparation preceding golf tournaments and before/after each round is limited. Self-regulatory processes including planning, self-monitoring, and reflection are important for sports performance and may be important for golf tournament preparation. In this thesis, the tournament preparation behaviours of golfers were described and used to develop a tournament preparation framework (TPF) and corresponding self-report instrument (TPF-SR).

In study one, 18 golfers and 12 coaches/practitioners were interviewed to determine the behaviours important for golf tournament preparation. Participants reported that specific behaviours to optimise psychological and physiological states, develop course strategy, and structure preparatory routines were important for tournament preparation. In study two, 36 content experts participated in a two-round Delphi to score the importance of 48 items (behaviours) using a 5-point Likert-type scale. Consensus (i.e., 67% agreement) was reached for 46 items and these were used to develop the TPF. In study three, the TPF-SR instrument was developed, and its validity assessed by comparing the level of agreement between 18 golfers' self-report administration of the instrument and multimethod observation/interviews. Comparison of endorsement rates for both measures showed good agreement. For the fourth study, golfers were observed in-situ and interviewed before/during a tournament to determine their endorsement of items from the TPF-SR. Linear and non-linear analytical models were developed to compare golfers' item endorsement with their World Amateur Golf Ranking to evaluate the discriminate validity of the TPF-SR. Golfers' endorsement of items relating to planning, self-monitoring, reflection, and task-specific strategies such as performing practice rounds was shown to discriminate between those of different rankings.

The TPF provides information for the refinement of golf learning environments and guidance for the development of individualised player preparation. Further, a TPF-SR instrument that displays suitable measurement properties allows for detailed tracking of behaviours for golfers of different participation levels.

STUDENT DECLARATIONS

Doctor of Philosophy by Publication Declaration

"I, Jarred Pilgrim, declare that the PhD thesis by publication entitled "The development of a tournament preparation framework for golf" is no more than 100,000 words in length including quotes and exclusive of tables, figures, appendices, bibliography, references and footnotes. This thesis contains no material that has been submitted previously, in whole or in part, for the award of any other academic degree or diploma. Except where otherwise indicated, this thesis is my own work".

Signature:  **Date:** 05/06/18

ACKNOWLEDGEMENTS

I would like to thank all those who made this doctoral thesis possible.

To Associate Professor Sam Robertson, thank you for your ongoing guidance, expertise, and support. I greatly appreciate all you and Peter have taught me over the last four years.

To Dr Peter Kremer, thank you for your support, guidance, and valuable feedback over the journey from Honours to PhD submission.

To Mr Brad James, Mr Matt Cutler, and Mr Tony Meyer from Golf Australia, your expertise and continued support has been crucial to the success of this project.

A special thanks to all those who volunteered their time to take part in this research. I would also like to acknowledge the PGA of Australia for their help in participant recruitment.

Mr Travis Pickles and Mr Rob Taylor, your assistance during data collection was essential for the completion of this work.

To Mum and Dad, thank you for your support over the years, not only for this project but also my preceding studies and endeavours. Without you, this thesis would not have been possible.

To Kate, thank you for your support and assistance with all things PhD (data collection, proofing, the list goes on). This would have been considerably less enjoyable without you. I look forward to living in a post-PhD world together (one down, one to go!).

LIST OF PUBLICATIONS AND SUBMISSIONS

Pilgrim, J., Kremer, P., & Robertson, S. (2018). The self-regulatory and task-specific strategies of elite-level amateur golfers in tournament preparation. *The Sport Psychologist, 32,* 169-177.

Pilgrim, J., Kremer, P., & Robertson, S. (2018). The development of a tournament preparation framework for competitive golf: A Delphi study. *The European Journal of Sports Science, 18,* 930-939.

Pilgrim, J., Kremer, P., & Robertson, S. (2018). The validity of a self-report version of the tournament preparation framework (TPF-SR) for competitive golf. *International Journal of Performance Analysis in Sport.* Accepted for review.

Pilgrim, J., Kremer, P., & Robertson, S. (2018). The discriminant validity of the tournament preparation framework self-report (TPF-SR) instrument in amateur golfers. *Research Quarterly for Exercise and Sport.* Accepted for review.

LIST OF ABBREVIATIONS

16PF = Cattell's Sixteen Personality Factor questionnaire

CM = Coaching Model

DMSP = Developmental Model of Sport Participation

DPT = Deliberate Practice Theory

FTEM = Foundation, Talent, Elite, and Mastery framework

GA = Golf Australia

HP = High-performance

IZOF = Individual Zones of Optimal Functioning model

LPGA = Ladies Professional Golf Association

LTAD = Long-Term Athlete Development Model

MAE = Mean Absolute Error

NSO = National Sport Organisation

PGA = Professional Golf Association

SPS = Sport Psychology Services

SS/SM = Sports Science and Sports Medicine

TOPS = Test of Performance Strategies

TPF = Tournament Preparation Framework

TPR-SR = Tournament Preparation Framework-Self-Report

WAGR = World Amateur Golf Ranking

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1 CHAPTER ONE – INTRODUCTION

OVERVIEW OF THESIS CHAPTERS

In Chapter One a review of the literature relevant to this doctoral thesis is presented across four sections. The first section "General introduction" discusses the multidisciplinary nature of golf performance, preparation for sport competition, and preparation for golf tournaments. It also provides an overview of theoretical frameworks and models relevant to athlete development. In the second section "Self-regulation" the conceptual framework of self-regulation is introduced, and a review of leading models is provided. The relationship between athletes' self-regulatory processes and performance in sport and, more specifically, in golf is also discussed. The third section "Relationship between multidisciplinary performance factors and tournament preparation" examines the interplay between tournament preparation and the multidisciplinary factors that contribute to golf performance. The fourth section "Applied frameworks and self-report instruments in sport" considers the methods and literature relevant to the development of applied frameworks and instruments for golf. The specific aims and objectives of each of the studies that comprise this thesis are detailed in the fifth section "Thesis aims and objectives".

Chapter Two to Chapter Five include the studies developed as a result of this thesis (i.e., Study I to Study IV). For Chapter Two (Study I – "The self-regulatory and task-specific strategies of elite amateur golfers in tournament preparation") interviews with golfers, coaches, and practitioners were used to identify the self-regulatory and task-specific strategies important for tournament preparation. Chapter Three (Study II – "The development of a tournament preparation framework for competitive golf: A Delphi study") comprised a two-round Delphi study in which coaches, high-performance staff, golfers, and academics scored the relative importance of tournament preparation behaviours to golfers of different participation levels. Chapter Four (Study III – "The validity of a self-report version of the tournament preparation

framework [TPF-SR] for competitive golf") evaluated the validity of the TPF-SR by assessing the agreement between golfers' self-report administration of the instrument and multimethod observations/interviews. Chapter Five (Study IV – "The discriminant validity of the tournament preparation framework self-report [TPF-SR] instrument in amateur golfers") assessed the discriminant validity properties of the TPF-SR by evaluating whether golfers' endorsement of instrument items could discriminate between those of different rankings. Chapter Six provides a general discussion of the findings that emerged from this thesis, the practical implications of these findings, the strengths and weaknesses of the methods used, and recommendations for future research.

1.1 Introduction

Golf is a club-and-ball sport in which players use different clubs to propel a ball around an assigned course in as few shots as possible. Modern-day golf originated in 15th-century Scotland and from humble beginnings has become a global phenomenon, with millions of participants worldwide and professional tours across the United States, Europe, and Asia (Evans & Tuttle, 2015). Increased professionalism and the emergence of the multi-billion-dollar golf industry has decreased the margins between success and failure, making it fundamental to understand the "science" of the sport. This has led many countries to adopt strategic approaches in the identification and nurturing of talented golfers. For example, National Sport Organisations (NSO) such as Golf Australia (GA) operate both state and national programs that seek to enhance the competitive standards that athletes attain through targeted funding and the provision of competition and training opportunities. These programs are particularly important for less populous countries like Australia that rely on a relatively small pool of gifted athletes (Vaeyens, Gullich, Warr, & Philippaerts, 2009). To inform the training and skill development activities featured in such programs, research must be performed to provide evidence of the characteristics putatively required for golfers to become experts (MacNamara & Collins, 2011).

With the development of fields such as sport science, coaching science, and sport pedagogy, the interest in golf as a platform for scientific inquiry has grown rapidly (Toms, 2018). To date, researchers have made progress in identifying the technical (Hellström, 2009a; Hume, Keogh, & Reid, 2005), physical (Doan, Newton, Kwon, & Kraemer, 2006; Wells, Elmi, & Thomas, 2009) and to a lesser-extent, psychological skills (Hellström, 2009b; Cotterill, Sanders, & Collins, 2010) that contribute to expert golf performance. While this information is useful for informing the coaching process, one criticism of studies that focus on individual

skill components is that they provide only a rudimentary understanding of sports performance (Glazier, 2010; Vilar, Araújo, Davids, & Button, 2012); that is, even if golfers possess the skills considered necessary for expert performance their potential to succeed still depends on other factors (MacNamara, Button, & Collins, 2010). Recently, researchers have advocated for an "ecological dynamics" approach to explain the factors that contribute to performance and learning in disciplines such as sport science, psychology, and physical education (Araújo & Davids 2011; Chow, Davids, Hristovski, Araújo, & Passos, 2011; Davids, Button, & Bennett 2008; Hristovski, Davids, & Araújo 2009). In ecological dynamics, the movement patterns that determine task performance emerge from the interaction of organismic, environmental, and task constraints (Glazier, 2017; Newell, van Emmerik, & McDonald, 1989).

Organismic constraints are those that reside within the boundaries of individual movement systems (i.e., performers) and can be classified as either structural or functional (McGinnis & Newell, 1982; Glazier, 2017). Structural-organismic constraints are relatively stable and include morphological factors such as anthropometrics of the torso/limbs, body mass, and genetic make-up (McGinnis & Newell, 1982; Glazier, 2017). In contrast, functional-organismic constraints often vary considerably, and include physiological or psychological attributes such as fatigue, anxiety, and focus of attention (McGinnis & Newell, 1982; Glazier, 2017). Environmental constraints are those external to the performer that are related to the spatial and temporal features of the performance environment. Some examples include ambient temperature, weather conditions, and reaction forces exerted by different contact surfaces (e.g., hitting out of a bunker vs. off grass in golf) (Glazier, 2017). Task constraints are those specific to the goals or rules of the task being performed, for example the playing boundaries or equipment used in task execution (McGinnis & Newell, 1982; Glazier, 2017).

While it is the combination of constraints acting on the performer that determine movement patterns (Newell et al., 1989), the relative contribution of these constraints on performance depends on the specific requirements of the performance context and the task being performed (Glazier, 2017). In golf, performers must negotiate the situational challenges of the competition environments including changing environmental- (e.g., weather and climatic conditions) and task-constraints (e.g., course design and layout). They must also contend with high volumes of international and domestic travel, practice, and competition that may present organismic constraints such as fatigue and mental or physical stress (Reilly et al., 2007; Fradkin, Cameron, & Gabbe, 2007). Hence, how golfers cope with the ancillary demands of competition, and prepare for the constraints of the performance environment may be as important in determining their scoring success as isolated skill components (Pinder, 2013; MacNamara & Collins, 2011). Golf tournaments comprise a series of rounds and usually occur over a period of four to five days; thus, players have the opportunity for preparation both in the periods preceding tournaments, and before/after each round. Collectively defined as "tournament preparation" the behaviours used by players and their support team to optimise performance in these periods represent a relatively unexplored area of the golf literature (Pilgrim, Robertson, & Kremer, 2016). Content relating to tournament preparation is included in some GA state development programs (Robertson, 2014), yet in the absence of peer-reviewed literature most of this content lacks scientific rigor and is replete with ambiguity.

A golfer's ability to prepare for constraints relative to the performance environment and to achieve and maintain desired states before and during competition is a fundamental goal for those of all levels. Goals are described as discrete end states that play a causal role in behaviour by specifying an aim or standard for a specific task (Locke & Latham, 2006; Hall & Kerr, 2001). Goal-setting is considered a discrepancy-creating process; in other words, it implies discontent between one's current state and a desired state or outcome (Locke & Latham, 2006). To reduce

discrepancies in the pursuit of goals, golfers can affect their environment by selecting and mobilising goal-directed behaviours. According to Locke and Latham's theory of goal setting the setting of more specific goals leads to concomitant increases in task performance when compared to no goals or abstract goals such as the common exhortation to "do one's best" (Locke & Latham, 2002; Locke & Latham, 1990). Increased goal specificity is proposed to increase performance by reducing ambiguity about what is to be attained and how to best attain it (Locke & Latham, 1990). A series of reviews and meta-analyses provide support for Locke's theory in both industrial (Locke & Latham, 1990; Wood, Mento, & Locke, 1987; Chidester & Grigsby, 1984) and sport settings (though to a lesser degree) (Burton & Naylor, 2002; Kyllo & Landers, 1995). From this perspective, identifying the behaviours important for tournament preparation could allow golfers to set more specific, measurable goals, and potentially improve their scoring outcomes (Locke & Latham, 1985). Knowledge of the processes used by players to direct and regulate their preparatory behaviours across changing contexts, often referred to as "self-regulation" may also be important. Therefore, the broad focus of this doctoral thesis is to identify and describe the self-regulatory processes and behaviours important for tournament preparation in golf.

Golfers can be categorised as either amateurs or professionals. Amateurs encompass a broad range of skill levels, yet this thesis will focus on "elite" amateurs; that is, highly skilled golfers that aspire to become professionals in order to forge sustainable careers through the sport. While both groups are relative experts, there are substantial differences in income between elite amateurs and tour professionals (i.e., those that compete on recognised golf tours). Tour professionals have the potential to earn considerable sums of money and secure lucrative endorsement deals, whereas amateurs are not permitted to accept cash prizes and survive on relatively small incomes. Rather, amateurs depend on the support of NSOs like GA for access to Sports Science and Sports Medicine (SS/SM) and specialist coaching services as

part of periodic team practice or during state development camps. In individual sports, programs for talented athletes encompass the development process from grassroots participation until athletes' emergence as financially self-sufficient performers (Gulbin, Crosser, Morley & Weissensteiner, 2013). Thus, at the amateur level, golf NSOs have the greatest influence on their athletes. Elite amateur golf is also a critical period of transition for golfers, defined by increased volumes of domestic and international travel to compete in tournaments. Considering these factors, the focus of this thesis is predominately elite amateur golf, as better understanding of the preparatory behaviours and practices important at this level will have greater impact on the education, development and long-term success of these golfers.

1.1.1 Preparation for Sport Competition

Whether it is the pursuit of financial rewards or a positive sense of self-achievement and fulfilment, athletes in most sports strive to perform at their best in competition (Mallett & Hanrahan, 2004). Yet despite the emphasis on competitive excellence, athletes spend most of their time in preparation rather than engaged in competition itself. Thus, training and preparation are for most athletes the means to competitive success (Woodman, Zourbanos, Hardy, Beattie, & McQuillan, 2010). With this in mind, athletes and coaches increasingly follow purposeful and scientific approaches to competition preparation. For example, since the mid-1950s athletes in most sports have organised their seasonal training into smaller units or "blocks" to taper and peak relative to specific competitions (Issurin, 2010; Pyne, Mujika, & Reilly, 2009). These periodised approaches often include training phases such as preparation, competition, and recovery that comprise specific training activities to develop athletes' physical, technical, tactical, and psychological skills (Smith, 2003; Bompa, 1999). Athletes' goals for physical preparation are often to develop their general athletic abilities such as strength, flexibility, and endurance. Technical preparation provides athletes with opportunities

to refine their technical skills and domain-specific movement patterns (Bompa, 1999; Blumenstein, Lidor, & Tenenbaum, 2005). In psychological preparation, athletes develop their psychological skills and strategies that can be used during competition to promote adaptive performance states (Blumenstein et al., 2005; Thomas, Hanton, & Maynard, 2007). Last, effective tactical preparation affords athletes the strategic knowledge needed to optimally execute their acquired technical skills in competition (Blumenstein et al., 2005).

A crucial aspect of preparation is the practice activities used by athletes to refine or develop their skills for competition. One seminal finding that has garnered much attention with regard to task practice is Ericsson and colleague's (Ericsson, Krampe, & Tesch-Römer, 1993) proposition that "the level of performance an individual attains is directly related to the amount of deliberate practice accumulated" (Ericsson et al., 1993, p. 370). In general, research in sport has provided support for this proposition, with more skilled athletes found to accumulate more hours of practice in their sport compared to less-skilled athletes (Baker & Young, 2014). While practice is clearly important for sport performance, a further consideration from ecological dynamics is the need to ensure there is adequate "sampling" of information from the performance environment to inform practice; thereby ensuring that preparation is representative of competition (Tan, Chow, & Davids, 2012). For this reason, practice task design should simulate the ecological constraints of the performance environment (Pinder, Davids, Renshaw, & Araújo, 2011).

Little is known regarding the behaviours used by athletes to prepare for the constraints unique to a specific competition. In one of the few studies in this area, Eccles, Ward, and Woodman (2009) interviewed 15 expert orienteers to examine the preparation and practice activities they used to adapt to the constraints of an upcoming competition. It was found that competition-specific preparation was crucial in orienteering because the constraints often vary

across competitions. The orienteers explained how they engage in a range of activities such as studying existing maps of terrain to gather information about the constraints of a competition environment. Orienteers then use this information to inform the design of practice tasks to represent the identified competition constraints. There is also anecdotal evidence to support these propositions in other sports. For example, Blumenstein et al. (2005) reported that expert judokas develop opponent-specific strategies in the lead up to competition. Experts in other sports in which the opponents change across competitions (e.g., tennis) describe the use of scouting reports detailing upcoming opponents' play statistics to plan and inform strategy (McPherson, 1999). These studies provide a glimpse into the behaviours used by athletes to prepare for constraints relative to competition. However, further research – particularly in sports that feature substantial variations in constraints between competitions – is needed.

1.1.2 Tournament Preparation

Although the golf science literature represents a growing field, limited work exists with respect to tournament preparation. In one of the few studies in this area, McCaffrey and Orlick (1989) interviewed 14 tour professionals and nine club professionals to explore the mental readiness strategies related to excellence in golf. The tour professionals reported common strategies that distinguished them from the club professionals, including setting daily/weekly practice goals; developing plans for practice and shot-making, and time schedules for preparation; using focus plans to control thought processes; and, evaluating performance to guide future efforts. While this work was seminal at the time, owing to the increasing professionalism of golf and advancements in technology and knowledge across sport science disciplines some of these findings may not be relevant to current practice.

More recently, in a series of three studies Davies and colleagues (Davies, Collins, & Cruickshank, 2014; Davies, Collins, & Cruickshank, 2017; Davies, Cruickshank, & Collins,

2017) explored the macro- (i.e., pre-competition) and meso-level (i.e., between shots/holes) processes of elite golfers. In their first study, Davies, Collins & Cruickshank (2014) provide a review of the research in this area and consider the behaviours which may be important for macro- (i.e., pre-tournament imagery, technical change/refinement, tactical planning) and meso-level (i.e., pre-pre-shot preparation, post-shot routine) performance. For their second study, 16 elite golfers, caddies, coaches, and practitioners took part in qualitative interviews and described a series of behaviours they perceived as important for golfers' macro-level performance such a preparing a strategy by identifying course-specific challenges; using consistent preparation routines (e.g., maintaining consistent volumes of practice); and, golfers rehearsing meso-level routines with their caddies before competition (Davies, Collins & Cruickshank, 2017). As the meso-level of performance was the foremost interest, macro-level processes were discussed in relation to how they affected golfers' ability to regulate their attention between shots/holes. Lastly, in their third study their focus shifted entirely to the meso-level, with in-situ observations and recall interviews used to examine the pre-pre-shot and post-shot routines of golfers during competition (Davies, Cruickshank & Collins, 2017). However, these studies did not provide any indication of how the importance or implementation of preparatory (i.e., macro) behaviours/processes may change for golfers of different participation levels. Also, like the work of McCaffrey and Orlick (1989) these studies lacked a robust theoretical basis and did not make explicit reference to underlying theory (Carpiano & Daley, 2005)."

Although these researchers offer some insight into the tournament preparation behaviours of elite amateur and professional golfers, the area is still at an exploratory stage of investigation. Specifically, there is limited knowledge of the full range of cognitive and behavioural factors that may be important for golfers in tournament preparation. Also, little is known about how these and other behaviours are integrated to establish preparatory routines;

which interpersonal qualities or skills are beneficial in the implementation of these routines; and, whether specific behaviours are considered more or less important for golfers of different participation levels. The provision of such information may be important for NSOs in refining educational curriculum and to better guide the development of prospective athletic talent.

1.1.3 Talent Development

NSOs receive funding from a wide range of sources (e.g., commercial sponsors) yet they are largely dependent on government funding (Brouwers, Sotiradou, & De Bosscher, 2015; Green & Houlihan, 2006). To access this funding NSOs are required to meet performance-based targets often aligned to athletes' success in Olympic Games and other international sport competitions (Sam, 2012). Of course, the funding received by NSOs also depends on the number of Olympic events and other competitions in which their athletes can compete and achieve success. For example, in the 2016 Summer Olympics golf featured two events and GA – the governing body of Australian golf – was allocated $804, 750 in high-performance funding for 2018/2019. In contrast, swimming and athletics featured 34 and 47 events, and Swimming Australia and Athletics Australia were allocated $6, 442, 253 and $4, 722, 493 in funding, respectively (Australian Sports Commission, 2018); thus, forcing NSOs like GA to operate on relatively small budgets. With limited resources available and the emergence of carrot-and-stick funding systems where funding is allocated based on competition success, improving the athlete development process is a critical focus for NSOs (Gulbin et al., 2013; Abbott & Collins, 2004). A number of athlete development models and frameworks have been proposed to explain how athletes achieve expert performance. Consequently, a practical dilemma for NSOs looking to optimise the athlete development process is deciding which model to subscribe to with so many candidates available (Gulbin et al., 2013).

According to a recent citation network analysis (Bruner, Erickson, McFadden, & Cote, 2009) which is used to visually represent the connectivity of citations (Hummon & Doreian, 1989), the models of Bloom (1985) and Ericsson and colleagues (Ericsson et al., 1993) have received the most research attention and are particularly influential in the field of athlete development. From qualitative interviews with world-class performers in science, sport, and the arts, Bloom (1985) outlined three stages in the careers of talented individuals: initiation, development, and perfection; with transition between the stages contingent upon learning and tasks achieved, rather than chronological age. Bloom (1985) also emphasised the role of significant others such as teachers, coaches, and parents in individuals' development. In contrast to Bloom's focus on within-career transition, Ericsson et al. (1993) claimed that expertise – that is, learning and skill acquisition – occurs as a result of structured, effortful activities, that are not inherently enjoyable, nor motivating, referred to as "deliberate practice" (Farrow, Baker, & MacMahon, 2013; Baker & Young, 2014; Ericsson et al., 1993).

Ericsson inferred a monotonic relationship between individuals' accumulated hours of deliberate practice and the performance level they attain (Ericsson, 2006). In other words, individuals that transition to the highest levels of performance have accrued the most deliberate practice. So, the deliberate practice theory (DPT) infers that those who specialise early and practice for longer will achieve higher levels of performance during development than those that start later. While the DPT was developed through case studies with musicians, a substantial body of work supports the role of deliberate practice in the attainment of expert sport performance (Baker & Young, 2014; Baker, Côté, & Abernethy, 2003; Berry, Abernethy, & Côté, 2008; Ward, Hodges, Starkes, & Williams, 2007). However, other evidence challenges the notion of the DPT and has questioned the longer-term ethical practices of this approach. For instance, some researchers indicate that early specialisation, and childhood engagement in high volumes of intense, prolonged deliberate practice can lead to negative consequences such

as overtraining, dropout, burnout, and overuse injuries (Baker, 2003; Baker, Cobley, & Fraser-Thomas, 2009; Ford, Coughlan, Hodges, & Williams, 2017). Another prominent model is the Developmental Model of Sport Participation (DMSP) (Côté 1999; Côté & Fraser-Thomas, 2007) which highlights the importance of developmentally appropriate training and social influences. The DMSP features three possible sport participation trajectories: recreational participation through sampling (6-12 years); sports specialisation through sampling leading to elite performance (13-15 years); and early specialisation (6+ years) leading to elite performance. With the different stages in each trajectory based on changes in the type and amount of sport activities performed by athletes. In particular, unlike the early specialisation approach of the DPT, the DMSP advocates for childhood engagement in unstructured, playful activity, until early adolescence (Côté & Fraser-Thomas, 2007; Côté, Murphy-Mills, & Abernethy, 2012). Playful activity, also termed deliberate play, is enjoyable, intrinsically motivational, led by the child, and often includes modified version of sports such as street soccer, backyard basketball, or miniature versions of golf (Côté, 1999; Côté et al., 2012). Some research suggests that athletes that follow the DMSP approach may benefit from enhanced skill acquisition, attainment, and intrinsic motivation (Côté et al., 2012). For example, studies examining decision-making in sport found that Australian football players (Berry, Abernethy, & Côté, 2008) and Olympic team sport athletes (Baker, Côté, & Abernethy, 2003) who displayed superior decision-making skills engaged in more playful activities during childhood compared to those with inferior decision-making skills.

More recently, the commercially-driven, long-term athlete development (LTAD) model (Balyi & Hamilton, 2004) has been widely adopted by NSOs in Canada, and the United Kingdom (Ford et al., 2011; Farrow et al., 2013; Côté & Vierimaa, 2014). The LTAD comprises six stages of talent development: fundamentals, learning to train, learning to compete, training to win, and retirement (Ford et al., 2011). While the LTAD includes the

complete athlete pathway from early engagement to exit from the sport, it is based on chronological age-based windows which have been criticised as inappropriate markers for development as individual athletes' maturation occurs at different time points (Gulbin et al., 2013). Further, the LTAD emphasises athletes' physicality at the expense of technical and tactical skills (Gulbin et al., 2013). Thus, an emerging criticism of the LTAD and other models is that they offer a segmented perspective of development, that focuses on the "parts" rather than the sum of the parts (Bullock et al., 2009; Ford et al., 2011; Tucker & Collins, 2012; Gulbin et al., 2013).

To address these limitations, Gulbin and other sport practitioners from the Australian Institute of Sport published the Foundation, Talent, Elite, and Mastery (FTEM) framework (Gulbin et al., 2013) – see Figure 1.1. The FTEM comprises four macro and 10 micro phases of development: Foundation (F1-F3); Talent (T1-T4); Elite (E1-E2); and, Mastery (M1). The framework also integrates active lifestyle, sports participation, and sporting excellence, as the three potential outcomes of sport participation (Gulbin et al., 2013). Unlike other models such as the LTAD and DMSP that are chronologically prescriptive, the FTEM is void of fixed-age boundaries. Further, unlike the DPT, the FTEM does not represent a mechanistic model of development; rather, it provides sport stakeholders with a platform which can be populated by developmental variables that align with each of the FTEM components. To optimise the use of the FTEM, it is therefore necessary to establish the ideal pathway to expertise in a given sport and identify the multi-disciplinary factors that contribute to performance at each level of development (Farrow et al., 2013). As the GA athlete pathway is based on the tenets of the FTEM framework, it was used to represent the hierarchy of athlete transition in all relevant research instruments and communication with GA coaches, athletes, and practitioners.

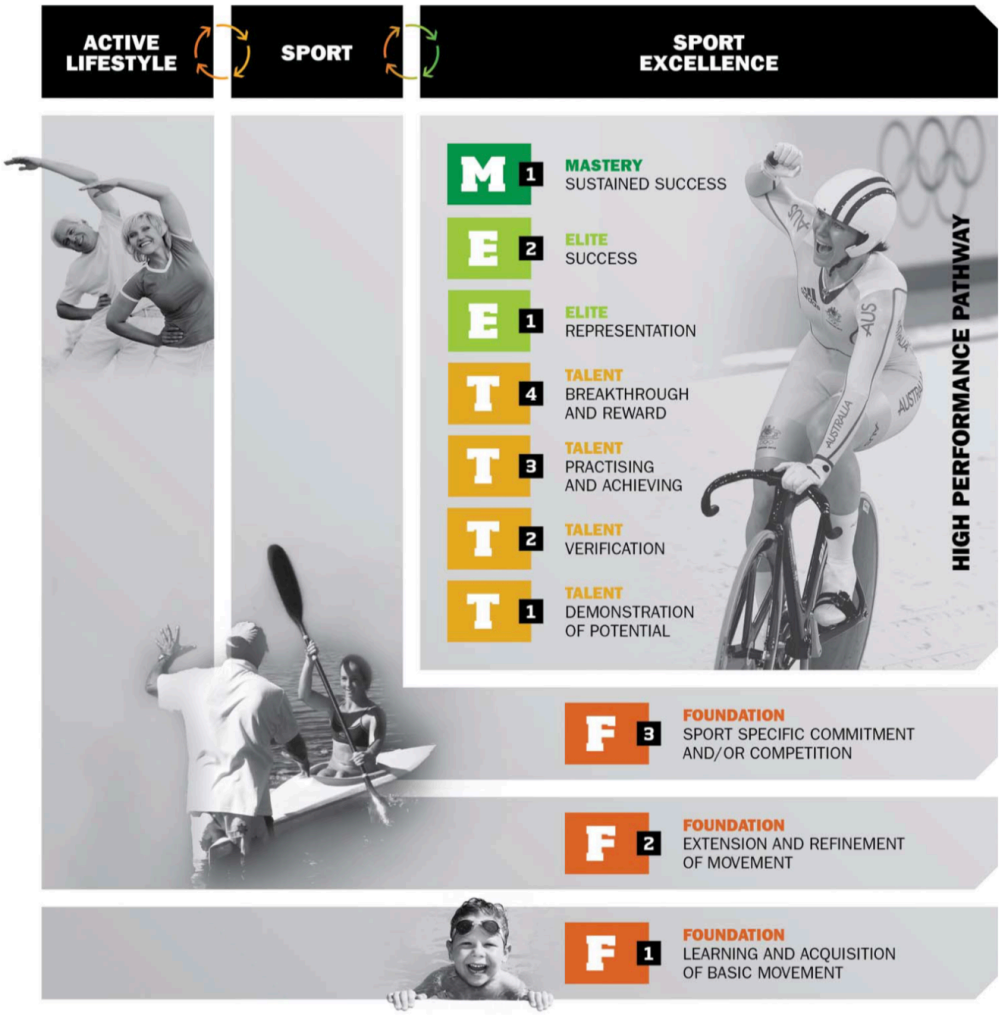


Figure 1.1. The FTEM framework (Gulbin et al., 2013).

1.2 Self-Regulation

Self-regulation, also known as self-regulated learning in academic or learning contexts, is a conceptual framework used to understand the cognitive, behavioural, and motivational aspects of learning and performance (Zimmerman, 2000; Panadero, 2017). Self-regulated athletes proactively approach activities, meaning they show personal initiative and perseverance (Zimmerman, 2006). Thus, self-regulation is particularly relevant in individual sports such as golf, in which many hours are spent alone in practice and competition (Anshel, 1995; Elferink-Gemser, Visscher, & Lemmink, 2008). Numerous models of self-regulation

have been proposed to explain how specific processes influence an individual's ability to self-manage behaviours, thoughts, and feelings. For instance, influential models include those presented by Zimmerman (2000), Pintrich (2000), and Winne and Hadwin (1998).

1.2.1 Pintrich's General Framework for Self-Regulated Learning

According to Pintrich (1995), self-regulation involves individuals' self-control of behaviour, motivation, and cognition. Notably, Pintrich emphasized the integration of motivational constructs in self-regulation and was one of the first to empirically examine the relationship between self-regulation and motivation (Pintrich & Groot, 1990; Panadero, 2017). Pintrich proposed a four-phase model of self-regulation comprised of forethought/planning, monitoring, control, and reflection (Pintrich, 2000). In phase one, individuals establish goals and plans, and access knowledge relevant to the task context. Phase two involves individuals monitoring their behaviour and cognition, and then mobilizing cognitive strategies to regulate different aspects of the task, context, and self in the third phase. Last, in phase four individuals make judgements about the outcome of the task and reflect on the process. Four different areas were described in which self-regulation may occur: cognition; motivation/affect; behaviour; and, context (i.e., task characteristics or features) (Puustinen & Pulkkinen, 2001).

1.2.2 Winne's Four-Stage Model of Self-Regulated Learning

Winne (1996) described self-regulation as the metacognitive behaviours that allow individuals to regulate their use of cognitive strategies under different task constraints. The most recent iteration of Winne's model (Winne & Hadwin, 1998) explores the cognitive and metacognitive aspects of self-regulation in greater detail than other models (Panadero, 2017). Based on this model, self-regulation occurs across four phases: task-definition (individuals generate an understanding of the task using contextual information and prior experience); goal setting and planning (individuals generate goals and plans for how to achieve them); enacting

strategies (individuals select and use specific strategies to achieve goals); and, metacognitive adapting of techniques (monitoring behaviour and using feedback to make changes to motivations and strategies for future efforts) (Winne & Hadwin, 1998).

1.2.3 Zimmerman's Social Cognitive Model of Self-Regulation

Zimmerman (2000) defined self-regulation as individuals' goal-orientated thoughts, feelings, and behaviours that are planned and cyclically adapted based on feedback. As one of the most prolific writers in this area, Zimmerman published three models of self-regulation: the triadic model of self-regulated learning (Zimmerman, 1989); the multi-level model (Zimmerman, 2000); and the cyclical phases model (Zimmerman, 2000). The cyclical phases model is often referred to as "Zimmerman's model" (Panadero, 2017; Panadero & Alonso-Tapia, 2014), thus further discussion refers exclusively to this model. The cyclical phases model was first presented in 2000 (Zimmerman, 2000) and since then has undergone two revisions to include new processes and strategies in 2003 (Zimmerman & Campillo, 2003), and more recently in 2009 (Zimmerman & Moylan, 2009). In this model, self-regulation occurs in three sequential phases: forethought (processes that precede efforts to learn or perform); performance (processes occurring during learning or performance efforts); and self-reflection (processes occurring after learning or performance) (see Figure 1.2) (Cleary, Callan, & Zimmerman, 2012).

Before beginning a task, self-regulated athletes set specific goals and develop plans for how to achieve their goals using task-specific strategies (i.e., forethought phase) (Ertmer & Newby, 1996; Kitsantas & Zimmerman, 2002). During the execution of their plan, athletes use their strategies and periodically monitor the effectiveness of each strategy relative to their goals (i.e., performance phase) (Ertmer & Newby, 1996). After completing the task, self-regulated athletes reflect and evaluate the success of the plan, and then use feedback to adapt their

performance in a systematic way (i.e., self-reflection phase) (Ertmer & Newby, 1996; Kitsantas & Zimmerman, 2002). The three phases of self-regulation are sustained cyclically by a self-regulatory feedback loop (Zimmerman, 2000); that is, the inferences made during reflection, influence forethought for future performance such as goal setting, strategic planning, and motivation. In sport, the cycle of self-regulation can be applied to the execution of a skill, an individual practice session, or even an entire competition.

As the most frequently cited model of self-regulation (Panadero, 2017) and the only model widely used in sport research (e.g., Cleary & Zimmerman, 2001; Kitsantas & Zimmerman, 2002; Cleary, Zimmerman, & Keating, 2006), Zimmerman's (2000) model was used as the theoretical basis for this doctoral thesis. Due to its flexibility this model can be applied to many different tasks and activities (Cleary et al., 2012). This is possible because the sequencing of the three cyclical phases is naturally linked to the temporal dimensions of most tasks. In other words, forethought processes occur prior to engaging in the task; performance processes occur during the task; and self-reflection processes occur upon task completion (Cleary et al., 2012).

Figure 1.2. The cyclical model of self-regulation (Zimmerman & Moylan, 2009).

1.2.4 Self-Regulation in Sport

Zimmerman's cyclical model of self-regulation has been the focus of three studies in sport. In the first two studies, researchers used a micro-analytic approach to ask athletes questions about their behaviours and cognitions during task execution to compare the differences in self-regulation of experts, non-experts, and novices (Cleary & Zimmerman, 2001; Kitsantas and Zimmerman, 2002). For the first study, 43 adolescent basketball players were assessed on their forethought goals, strategy choice, self-efficacy, and self-reflection while performing a free-throw task (Cleary & Zimmerman, 2001). The expert players set more specific goals, selected more technique-orientated strategies, and demonstrated higher levels of self-efficacy than both the non-experts and novices (Cleary & Zimmerman, 2001). In the second study, 30 female volleyball players were compared on self-efficacy, intrinsic interest, perceived instrumentality, self-satisfaction, goal-setting, planning, strategy use, self-monitoring, self-evaluation, attributions, and adaptation as they practiced a serve (Kitsantas &

Zimmerman, 2002). Again, experts set more specific goals, planned more structured practice, and used self-regulatory skills more often than the non-experts and novices. The third study to test Zimmerman's model used an experimental design to train 50 students in basketball free throws using five practice conditions: one-, two-, or three-phase self-regulation, control group practice-only, and, control-group no practice (Cleary et al., 2006). It was found that more phases of self-regulation resulted in better scores in the free-throw task. Together, these findings indicate that self-regulation is important for task-learning and sport performance. However, because limited causal inferences can be drawn from these descriptive studies, further experimental studies are needed to confirm this relationship.

A number of researchers have used cross-sectional questionnaire studies to investigate the relationship between athletes' self-regulation and participation level. One study administered a questionnaire to 222 international and national level athletes from several team- and individual-sports to assess six dimensions of self-regulation: planning; self-monitoring; evaluation; reflection; effort; and self-efficacy (Jonker, Elferink-Gemser, & Visscher, 2010). Individual-sport athletes outscored their team-sport peers on the dimensions of planning and effort. With respect to participant level, "reflection" – the extent to which athletes were able to appraise what they had learned and adapt past knowledge – discriminated between the international and national level athletes. In a similar study, 444 elite and non-elite soccer players completed a questionnaire to assess the same six dimensions of self-regulation (Toering, Elferink-Gemser, Jordet, & Visscher 2009). Higher scores on reflection and effort increased the likelihood of players belonging to the elite group. A critique of these studies is that while cross-sectional designs can be used to infer causation, it can be difficult to reliably determine cause and effect from simple association (Mann, 2003). A further limitation is that the measurement instruments used were based on generic subscales and inventories from non-sport domains. For instance, the Reflective Learning Continuum (Peltier, Hay, & Drago, 2006)

used to measure athletes' reflection was originally developed for use in academic disciplines. These types of self-report measures are also inherently vulnerable to measurement error due to both unconscious and conscious bias (Ekegren, Donaldson, Gabbe & Finch, 2014). Conscious bias may reflect efforts to respond in a socially desirable fashion by over- or under-reporting specific responses; essentially "faking good".

A cross-sectional design was also used to examine the differences in self-regulation of elite and non-elite swimmers (Anshel & Porter, 1995; Anshel & Porter, 1996). Yet, distinct from the research discussed previously, Anshel and Porter (1995) purposefully developed a questionnaire for use with athletes through interviews with coaches, swimmers, and a review of the extant literature. Thus, providing a more domain-specific measure of self-regulation in this context. In a series of two studies (Anshel, 1995; Anshel & Porter, 1996), the 100-item Likert-type questionnaire was administered to two groups of swimmers: the first, comprised of 77 elite and 48 non-elite male swimmers (Anshel & Porter, 1995); and the second comprised of 146 elite (male = 79, female = 67), and 124 non-elite (male = 57, female = 67) swimmers (Anshel & Porter, 1996). Results from these two studies showed that elite and non-elite swimmers differed on the dimensions of commitment and execution, favouring elites (Anshel, 1995). Elite swimmers were also more self-directed and engaged in self-regulatory thoughts and behaviours more often before and during competition (Anshel, 1995; Anshel & Porter, 1996), with minimal differences between males and females (Anshel & Porter, 1996).

In sum, there is tentative support for the role of self-regulation in sport performance. However, most studies are plagued by methodological limitations relating to their research design and respective measurement instruments. For instance, decontextualized self-report measures that are not linked to specific tasks or domains are widely used for the study of self-regulation in sport. Despite some disagreement over whether self-regulation is an enduring,

stable trait or a transitory, state-specific skill, research comparing the structure of state and trait self-regulation has found evidence for the differential stability of both state and trait measures of self-regulation (Hong, 1995). In other words, self-regulation has a trait element as well as a state/skill element. Thus, emphasising the importance of self-regulation both in context and as a transferable skill that can be applied across multiple domains or learning environments. With this in mind, there is a need for more robust, theory-based research in sport that utilises context-specific measures of self-regulation.

1.2.5 Self-Regulation in Golf

Research examining the application of self-regulation to golf is relatively scant. In one of the first studies in this area, Kirschenbaum and Bale (1980) developed a five-component, cognitive-behavioural program to help golfers improve their on-course self-regulation. The "Brain Power Golf" program trained golfers to develop checklists to plan for each shot; visualise shot outcomes; monitor club and shot effectiveness during a round; and self-administer positive, instructional statements when required. Results from two studies showed that a small sample of college golfers (n = 3) displayed at least a one-stroke improvement in performance over an 18-hole round. As a successor to Brain Power Golf, Kirschenbaum and others (Kirschenbaum, Owens, & O'Connor, 1998) proposed 'Smart Golf' as a program to improve golfers' mental game. The Smart Golf program included strategies to assist golfers in planning shots more effectively, applying imagery and pre-shot routines more consistently, and reacting to shots in a more positive fashion. Further, the program emphasised the importance of preparation such as practicing and stretching before each round and encouraged golfers to use a scoring system to self-monitor their progress. To evaluate the program, five experienced golfers participated in four, two-hour training seminars to learn the components as well as the self-monitoring scoring system. The self-monitoring system asked golfers to score themselves

on five Smart Golf components, Preparation (i.e., pre-round warm up and range practice); Positive focussing (i.e., directing attention towards good shots); Plan (i.e., planning strategy relative to handicap, emphasising conservative shots); Apply (i.e., identifying targets, using visual imagery, committing to each shot, using pre-shot routines); and, react (i.e., using positive self-talk, emphasising adaptative reactions to poor shots). Golfers were instructed to allocate either one, two, or no points on a graded-scale relative to the perceived effectiveness of their pre-round preparation. For all other components they assigned a point for each hole if they followed the respective principles; resulting in a maximum Smart Golf score of 74. Each of the score cards collected during the four-week intervention period were examined. Outcome measures included golfers' average score, handicap index, and psychological skills as measured by the Test of Performance Strategies (TOPS) (Thomas, Murphy & Hardy, 1999). Overall, golfers improved their scores by an average of 2.1 strokes/round from baseline to the end of the training period. They also decreased their handicaps by an average of 1.3 points and increased the frequency of their emotional control and positive self-talk from baseline to three-month follow-up.

Beauchamp and others (Beauchamp, Halliwell, Fournier, & Koestner, 1996) used an experimental approach (i.e., pre-post design) to examine the effects of a 14-week cognitive-behavioural intervention on the motivation, preparation, and putting performance of 65 novice golfers. Golfers in this study were assigned to one of three groups: cognitive-behavioural; physical skills training; and control. The cognitive-behavioural group received training in putting technique, psychological skills, stress management, self-regulation, and self-monitoring. Golfers in the physical skills group were educated on physical skills and putting mechanics. Last, the control group followed a regular golf skill development program but with no instruction on putting. It was found that golfers in the cognitive-behavioural group displayed

enhanced intrinsic motivation, more consistent pre-putt routines, and improved putting performance relative to participants in the other groups.

Other studies have examined individual aspects of self-regulation. One study used Carver's (1979) model of self-regulation to examine the effects of differential self-monitoring in 109 unskilled golf participants (Johnston-O'Connor & Kirschenbaum, 1986). Participants were randomly assigned to one of three groups: positive self-monitoring; neutral self-monitoring; or, the control group with no self-monitoring. They then received instructions on how to perform a golf swing and took part in three practice sessions. Measures included ratings by observers on the swing change from baseline (quality, consistency, missed shots) and self-reported change in relevant attitudes. Those who positively self-monitored showed more improvements in performance and concomitant attitudes towards golf compared with those who self-monitored in a neutral fashion or those that did not self-monitor at all. However, the ecological validity in this study was low due to the lab-based training sessions, and the use of perforated, light-weight "wiffle" balls rather than standard golf balls. In another study, Cohn (1991) interviewed 19 professional and collegiate golfers to determine the psychological characteristics of peak performance in golf, defined as an episode of superior functioning (Privette, 1983). Golfers reported feeling highly focused, immersed in the task, physically relaxed, and in complete control during episodes of peak performance. As the ability to control and regulate arousal was associated with peak performance states, self-regulation was considered an important determinant of golf performance.

Goal setting was examined by Kingston and Hardy (1997) who sought to compare the effects of two types of goal-setting training programs on specific psychological characteristics and golf performance. In this study, 28 club golfers were assigned to one of two goal-setting training groups: process-goal orientated, or outcome-goal orientated. The control group was

comprised of nine golfers that chose to complete the questionnaires but did not want to commit to the training program. Over a one-year period, golfers in the goal-setting groups participated in a series of lectures, workshops, and individual training sessions. Following the study period, comparisons to baseline data found improvements in golfers' self-efficacy, cognitive anxiety control, and concentration for the process-goal group, whereas no changes were found for the performance-goal or control groups. There were also minor improvements in golfers' handicaps for the process-goal group. These findings provide evidence of the positive impacts of process goals in competitive situations. The studies discussed above provide preliminary evidence for the role of self-regulation in golf performance. Yet, to date there has been insufficient consideration of how these variables interact and influence golfers' performance in competition.

Tournament preparation in golf provides a useful platform for the study of self-regulation because of a number of characteristics of the sport. First, golf performance depends on the player's ability to achieve and maintain physiological and psychological states appropriate for the execution of complex technical skills (Smith, 2010). As discussed in section 1.1, the golf competition environment presents many challenges and related stressors such as frequent travel (i.e., jet lag) (Reilly et al., 2007); unfamiliar cultural and climatic conditions (i.e., nutritional issues, physiological disturbances) (Heaney, O'Connor, Naughton & Gifford, 2008; Smith et al., 2012); and high volumes of practice/competition (i.e., accumulated fatigue, injury risk) (Fradkin et al., 2007) that may interrupt adaptive states. Due to the complexities of the swing and other fine-motor skills performed during play (e.g., putting) these factors can influence technical skill execution. Consequently, the behaviours used by golfers to self-regulate and monitor/influence organismic constraints before and during a tournament may influence scoring success. Third, unlike other individual sports such as bowling or archery in which the performance environment remains relatively stable, golf course design and

environmental constraints can vary considerably. Golfers must continuously adapt their strategic plans to ensure they are relevant to the specific constraints of the tournament course. Fourth, golf tournaments are played over a series of rounds, interspaced with periods of relative downtime. During this time, there is potential for the golfer to undertake extensive self-monitoring, reflect on performance, and to use specific strategies to optimise their psychological and physiological condition and to adjust course strategy for subsequent rounds.

Although self-regulation seems important for tournament preparation, at the present time, there remains a dearth of knowledge concerning the specific self-regulatory behaviours used by golfers in this period. While some of these behaviours are observable (e.g., warm-up routines) there are other strategies (e.g., nutrition protocols) that are understated, but possibly of an equal importance. Further, as the quality of an athlete's self-regulation has been shown to differ as a function of skill level (Cleary & Zimmerman, 2001; Kitsantas & Zimmerman, 2002) the relative importance of these processes may also differ for players of different skill levels. For example, elite golfers often work with a caddie to analyse the course and develop course strategy prior to competition (Pilgrim et al., 2016). However, unlike elites, lesser-skilled golfers typically do not have access to a caddie; therefore, it is likely that the involvement of the caddie in tournament preparation will be less of a priority for these golfers.

1.3 Relationships between Multidisciplinary Performance Factors and Tournament Preparation

This section reviews and discusses the literature particularly relevant to tournament preparation and the multidisciplinary factors that contribute to golf performance.

1.3.1 Physiological

Success in golf requires the consistent execution of complex technical skills during the course of play (Smith, 2010). To execute these skills with a high degree of proficiency it is crucial for players to function in a stable physiological state. However, players are faced with many challenges such as frequent travel and extensive physical demands before and during competition; thus, if not properly accounted for these (and other) factors may have adverse effects on player's internal states and task execution.

1.3.1.1 Travel

Elite amateur and professional players frequently travel from one country to another to participate in competition. During travel, players can experience difficulties in their acute adaptations to new environments. For example, developing countries may provide reduced food and water quality that can expose players to gastrointestinal upset and possible illness (Reilly et al., 2007). Further, the food provided by commercial airlines, sporting venues, and accommodation is often unsuitable for player's nutritional requirements (Heaney et al., 2008). Dehydration can also affect performance by reducing shot distance, accuracy, and distance judgements in hot and humid climates (Smith et al., 2012). By considering nutritional and situational concerns in advance, players can plan ahead and counteract many of these issues. For example, making prior contact with accommodation venues can afford players the opportunity to request particular meals or to make alternative arrangements (Close, Pugh, & Morton, 2018).

International or domestic travel across multiple time zones can result in the syndrome of jet lag (Reilly et al., 2007). Symptoms, such as sleep disruption, decreased mental and physical performance, and gastrointestinal disturbances are caused by a mismatch between "body clock time" and new local time (Manfredini, Manfredini, Fersini, & Conconi, 1998; Reilly et al., 2007). Behavioural approaches to manage the symptoms of jet lag often include

the appropriate timing and composition of meals (Manfredini et al., 1998), exposure to or avoidance of bright light, and the use of supplemental caffeine to maintain daytime alertness (Reilly et al., 2007). Most important is to allow time for the player's body clock to adapt to the new local time before competition begins (Reilly et al., 2007). Although, sufficient time for adaptation can be difficult to organise for some players (e.g., amateurs) due to their limited financial resources.

1.3.1.2 Physical demands

Golfers spend most of their time within a round engaged in low-intensity, locomotive activity, yet in the in the fraction of a second it takes to perform a swing, club head speeds can reach upwards of 160 kilometres per hour (Egret, Vincent, Weber, Dujardin, & Chollet, 2003). Overall muscle activity when using a 5-iron can also reach 90% of maximal voluntary contraction for amateurs and 80% for professionals (Hosea, Gatt, Galli, Langrana, & Zawadsky, 1990). Professional players may perform up to 300 swings in a single practice session and hit over 2000 shots per week (Thériault & Lachance, 1998). Together, these factors can place considerable stress on the body; thus, suitable countermeasures such as warm-up or recovery routines are crucial for players to preserve their physical condition, offset fatigue, and reduce injury risk (Fradkin, 2018).

Despite golf being considered a lower intensity activity (relative to most other sports), soft tissue, and musculoskeletal injuries associated with overuse are common (Fradkin et al., 2007). Despite golf being considered a lower intensity activity (relative to most other sports), soft tissue, and musculoskeletal injuries associated with overuse are common (Fradkin et al., 2007). For instance, a series of retrospective, 12-month injury studies found that injury incidence for 1,865 total players ranged from 31.7-38.2% (Fradkin, 2010; Fradkin, 2012; Fradkin & Eisenhart, 2011). Competitive and recreational athletes often use warm-up activities

prior to competition to prevent sports-related injuries and enhance subsequent performance (Fradkin, 2010). Studies in golf have reported substantial increases in club head speed (Fradkin, Sherman, & Finch, 2004) and decreases in injury occurrence (Fradkin et al., 2007) when players participated in a pre-round warm-up. Decreases in club head speed, ball displacement, and accuracy have also been observed when golfers followed a passive stretching routine before competition (Gergley, 2009). However, studies that reported on the positive benefits of warm-ups (Fradkin et al., 2004; Fradkin et al., 2007) asked golfers to perform static stretches after an initial period of dynamic exercise to increase body temperature. So, rather than avoiding pre-round static stretching it may be the order of exercise programming that is of higher importance. While pre-round warm-up exercise seems important for golf performance, few studies have confirmed whether golfers perform such behaviours. In one of the few studies in this area, Fradkin, Sherman, and Finch (2001) found completion rates of 53% for warm-up activities as self-reported by 1040 amateur golfers. Although, as these players were club-level golfers, differences in completion rates may also be observed with more elite participants.

Due to the factors described above, players may experience acute or accumulated fatigue during competition (Halson & Jeukendrup, 2004; Versey, Halson, & Dawson, 2013). Fatigue is defined as the sensation of tiredness and associated decrements in muscular performance and function (Abbiss & Laursen, 2005). To maintain performance, fatigue should be minimised by recovering as fast as possible (Versey et al., 2013). Elite athletes increasingly use specific techniques to accelerate recovery and gain a competitive advantage. For example, cold water immersion (Versey et al., 2013; Leeder, Gissane, Someren, Gregson, & Howatson, 2012) and contrast therapy (i.e., alternating hot/cold) (Versey et al., 2013) are widely used by athletes (Vaile, Halson, & Graham, 2010) and have been shown to enhance recovery (Versey et al., 2013; Leeder et al., 2011). The use of compression garments also has therapeutic potential for enhancing recovery from muscle damage (Hill, Howatson, Van Someren, Leeder,

& Pedlar, 2014). To date, however, researchers are yet to examine the influence of recovery methods in golf, and there is little empirical knowledge of whether golfers perform such behaviours.

Blood glucose can fall by up to 10-30% during an 18-hole round of golf (Broman, Johnsson & Kaijser, 2004); resulting in fatigue and poor decision-making which may impair performance (Brooks, Fahey & White, 2000). Thus, specific nutritional strategies such as the provision of carbohydrate-rich foods during play may also be beneficial to offset any manifestation of fatigue (Close, Pugh & Morton, 2018). Sleep is increasingly gaining attention among scientists and practitioners due to its restorative effects and importance in training and competition recovery (Kolling et al., 2019; Gupta, Morgan & Gilchrist, 2017). Recent studies have reported significant relationships between sleep quality and competition outcomes (i.e., winning/losing) (Brandt, Bevilacqua & Andrade, 2017) and sleep duration and sport performance (Silva & Paiva, 2016). With this in mind, golfers and their support teams should be mindful of the need for suitable sleep-hygiene practices and the possible implications for fatigue-recovery and performance during competition.

1.3.2 Psychological

In competitive sport, an athlete's ability to achieve psychological states appropriate for the execution of their well-learned skills is an important determinant of success (Cotterill et al., 2010). Thus, considerable effort has been directed towards how sport performers achieve and maintain episodes of superior functioning, often referred to as "peak performance" (Harmison, 2011). From an extensive review of the literature, Krane and Williams (2006) concluded that specific psychological characteristics such as self-confidence, feelings of control, total concentration, task focus, positive thoughts, and commitment are associated with peak performance. Further, interviews with world championship and Olympic athletes and

coaches from different sports found that peak performance is associated with the automatic execution of task performance (Anderson, Hanrahan, & Mallett, 2014). Studies in golf have provided support for this notion, relating peak performance with being totally focused, performing effortlessly, being in control, and high self-confidence (Cohn, 1991; Hellström, 2009b). Hardy and colleagues (Hardy, Jones, & Gould, 1996) proposed a hierarchical model to explain the myriad of factors that influence athletes' attainment of peak performance states (see Figure 1.3) (Aoyagi, Portenga, Poczwardowski, Cohen, & Statler 2012). The five-component "unifying model of psychological preparation for peak athletic performance" consists of foundational attributes; psychological skills and strategies; adversity coping strategies; and, environmental factors. With all of these factors influencing the likelihood of performers attaining their ideal performance state (Harmison, 2011).

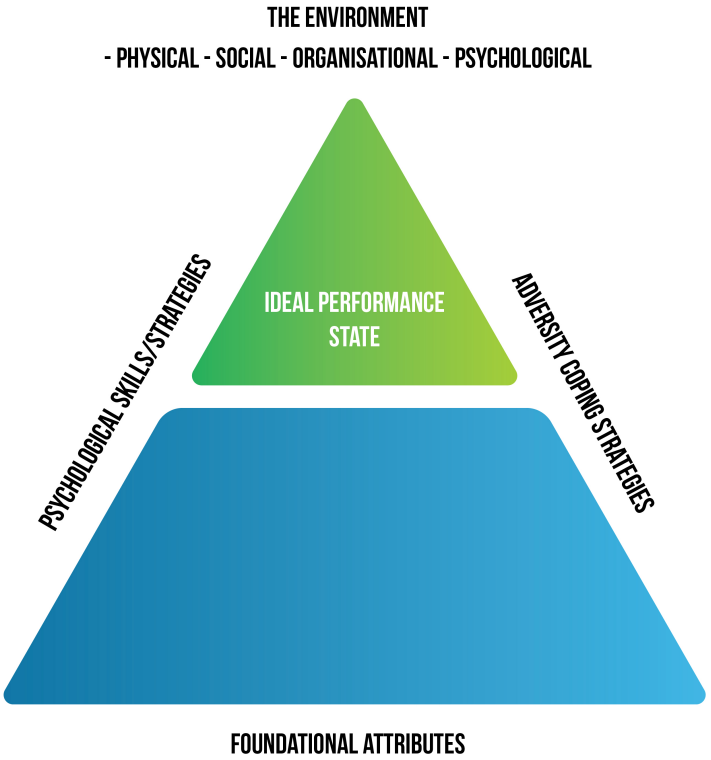


Figure 1.3 Model of the role of psychological factors in achieving ideal performance states (Hardy et al., 1996).

1.3.2.1 Ideal performance states

At the pinnacle of the model is the athlete's goal in preparation; being, an ideal performance state, which is described as the athlete's mental and emotional state that is most conducive to them achieving peak performance (Harmison, 2011). According to Hanin's (1997, 2000) Individual Zones of Optimal Functioning (IZOF) model individual athletes experience a unique range of positive and negative psychobiological states such as anxiety, self-efficacy, and arousal that can either facilitate or inhibit their performance. From this perspective, an athlete's ideal performance state can be considered a state in which different emotions and parameters are at an optimal intensity or within an idealised "target zone" (Gould & Tuffey, 1996; Raglin & Hanin, 2000). The next two components highlight the importance of psychological skills and coping strategies in the pursuit and maintenance of such a state.

1.3.2.2 Psychological skills and strategies

Psychological strategies are frequently used by amateur and professional players alike and can distinguish successful players from their less-successful peers (Hayslip, Petrie, MacIntire, & Jones, 2010; Bois, Sarrazin, Southon & Boiche, 2009). Bois and colleagues (Bois et al., 2009) used a prospective design to investigate the psychological characteristics of professional players and their relationship to golf performance. Forty-one male professional players completed a pre-tournament self-report questionnaire to assess their perceived competence, performance strategies, emotional reactions and achievement goals. Players that made the cut had higher scores on performance-approach goals, relaxation strategies, and attentional/emotional control. In a similar prospective study, Hayslip et al. (2010) examined the influence of golfers' skill level on mental skill utilisation, and the influence of golfers' mental skill utilisation on performance during competition. Male (n = 1151) and female (n = 173) golfers completed a questionnaire to assess mental skill utilisation, golf-specific skills,

and competitive trait anxiety. In general, golfers who were more skilled (i.e., lower handicaps), irrespective of age, reported greater use of mental skills. Further, across three rounds of competition the most salient predictors of tournament performance were automaticity, commitment, and disruptions to concentration (between shots). A criticism of these studies is that the questionnaires borrowed items from previously published instruments (e.g., TOPS instrument; Thomas et al., 1999) that were not validated for use in this context. Further, while these studies offer some useful insights, there is a need for more controlled, experimental evidence in this area.

A pre-performance (i.e., pre-shot) routine is one strategy used by players prior to execution that includes a collection of behaviours (i.e., target glances, club waggles) and cognitive activities (i.e., self-talk, imagery) (Hellström, 2009b; Cotterill et al., 2010). Structured routines are often discussed in reference to the on-course component of golf, yet few studies have explored the player's use of psychological skills in the period immediately prior to competition. In one of the few studies in this area, Beauchamp, Bray, and Albinson (2002) used a cross-sectional self-report design and asked 52 amateur players to complete a modified version of the Sport Imagery Questionnaire after a round of competition. Findings revealed that pre-competition imagery was positively correlated with lower scores. Once a player executes a shot, attention shifts toward the evaluation of shot outcome, often referred to as the post-shot routine (Finn, 2009; Pilgrim et al., 2016). The components of such routines include: dealing with emotions (e.g., venting); reflecting to consider the reasons for a particular shot outcome (often with the assistance of the caddie); and, acceptance of outcome to disengage between shots (Davies et al., 2017; Pilgrim et al., 2016). While previous studies have not considered the role of such processes in the post-round period, the underlying mechanisms may function on the same basis. That is, after a round players may attempt to neutralise emotion, gain acceptance of scoring outcomes, and to reflect on decision-making and course strategy.

Strength-based approaches to tournament-debriefing, such as "GOOD, BETTER, HOW" have recently been advocated and encourage players to recall "three good things" that occurred, suggest one thing they would like to do better, and propose ideas on how they could improve (Marriott & Nilsson, 2011; Gordon & Nair, 2018). Despite recent popularity, it is not known whether players actually use such methods in the post-round period, or if the caddie/coach is involved in this process. Behavioural or cognitive efforts to disrupt players' attention in the period between shots are posited to preserve attentional resources (Hayslip et al., 2010; Pilgrim et al., 2016). Caddies may facilitate this process by using conversation to distract the player and re-direct his/her attention, thus allowing them to concentrate more effectively when they reach the ball (Pilgrim et al., 2016; Davies et al., 2017). Concentration disruption may also be important in the period between rounds, yet there is no research to support this contention.

1.3.2.3 Adversity coping strategies

During competition, sport performers encounter both performance and organisational stressors (Mellaliue, Neil, Hanton, & Fletcher, 2009). Organisational stressors are issues not directly related to performance, such as finances, and arranging nutrition or travel. Whereas performance stressors encompass all demands directly related to performance, such as opponents or scoring outcomes (Mellaliue et al., 2009). Stressors can contribute to performance failure; thus, for athletes to perform successfully they must be able to cope with competitive stress (Lazarus, 2000). Coping has been defined as "constantly changing cognitive and behavioural efforts to manage specific external and/or internal demands that are appraised as exceeding the resources of the individual" (Lazarus & Folkman, 1984, p. 141). Several studies have assessed the sources of competition stress perceived by golfers. In one study, 11 amateur golfers completed a daily coping diary comprised of a stressor checklist adapted from Anshel

(1996) and an open-ended response section over a 31-day period. The checklist included: making a physical or mental error; being criticised by the coach; observing an opponent cheat; sustaining pain, injury or illness; receiving an incorrect call from an official; observing an opponent perform well; difficult weather conditions; and being distracted by the crowd. Four stressors (i.e., physical error, mental error, opponents playing well and weather conditions) comprised over 75% of the stressors reported by golfers (Nicholls, Holt, Polman, & James, 2005).

A further study used a longitudinal approach to analyse the coping skills of five Scottish amateur golfers using daily coping diaries maintained over a 28-day period (Nicholls, 2007). The most reported stressors were related to opponents, performance, putting, outcome and weather. To deal with these and other stressors, golfers report using cognitive (i.e., rationalising, blocking, self-talk), emotional (i.e., breathing exercises, seeking on-course social support) and behavioural (i.e., following routines) strategies (Nicholls et al., 2005; Nicholls, 2007). While there is extensive information regarding the sources of stress and coping for performance stressors in golf, there is less understanding of how golfers manage organisational stressors. Organisational stressors include issues relating to the performance environment, such as facilities (e.g., competing in unfamiliar conditions) as well as time management and planning (e.g., travel-related planning/logistics) (Mellalieu et al., 2009). Stressors may also be more prevalent for elite or non-elite performers. For instance, in a recent study concerns relating to nutritional planning were highlighted by non-elite athletes, whereas having insufficient information about the performance environment was reported solely by elite athletes (Mellalieu et al., 2009). This could be particularly relevant for golfers of different participation levels. At an amateur level, golfers often travel to tournaments as part of a squad or team. This scenario may present different organisational stressors compared to elite amateur or professional golfers that frequently travel alone.

1.3.2.4 Foundational attributes

This component of the model includes the personality traits, motivational orientations and philosophical beliefs of the athlete. One might consider these attributes to be relatively fixed traits. Research on golfers' psychological foundations has focused on personality (Hellström, 2009b), referred to as the psychological qualities that contribute to individual's enduring patterns of feelings, thinking, and behaving (Pervin & Cervone, 2010). These studies have mostly examined personality from a trait perspective with the aim to identify the attributes of the "elite golf personality" often using generic inventories such as Cattell's Sixteen Personality Factor (16 PF) (Hellström, 2009b); which is a questionnaire used to profile individuals based on 16 "normal-range" personality traits (Cattell & Mead, 2008). In one study, 30 high-level amateur golfers were compared with 30 medium handicap golfers. The only significant difference between the groups was in the trait category humble versus assertive; suggesting that the high-level golfers were more aggressive, competitive, and self-assured (Cockerill, 1968). However, the opposite was found when 32 players from the Ladies Professional Golf Association (LPGA) completed Cattell's 16 PF questionnaire (Graham, 1982). The scores indicated that the champions were more humble, introverted, and subdued. In sum, investigation into the traits of skilled golfers as measured by the 16 PF has provided ambiguous results. The limitations of these studies are two-fold. First, the use of the 16 PF in sport psychology research (and practice) has been criticised because of its non-athlete, clinical focus, and questionable psychometric properties (Hardy, Roberts, Thomas, & Murphy, 2010). Second, following the widely discussed "credulous vs. sceptical" debate (Morgan, 1980) regarding the efficacy of personality tests in sport, most researchers and practitioners have concluded that personality questionnaire data has little use in sport settings. For instance, Vealey (1992, p. 50) indicated that 'no distinguishable "athlete personality" has been shown to

exist.' In agreement with Vealey, Morris (1995) concluded that there was no evidence from earlier research conducted within sport that performance is related to personality traits.

1.3.2.5 The environment

Enveloping the model are the physical, social, organisational, and psychological factors that may either increase or decrease an athlete's ability to attain and maintain a peak (or ideal) performance state (Harmison, 2011). For example, the environmental- (i.e., weather conditions) or task-constraints (e.g., golf course design) of the tournament or competition venue may decrease athletes' confidence if they are unfamiliar or ill prepared to perform under the specific conditions (Harmison & Caston, 2012). As indicated by Woodman and Hardy (2001) organisational factors such as a lack of financial or organisational support can be perceived by some athletes as a source of stress and also subsequently interfere with their ability to achieve ideal performance states during competition.

1.3.3 Tactical

Unlike other sports where the playing area is standardised for court dimensions, surface, environment (indoor sports) and other variables that influence scoring, golf is rarely played under the same conditions, or on the same course (Farrally et al., 2003). Thus, dealing with the different terrains and environments presents a challenge for amateur and professional golfers alike. Courses are different in design and present novel conditions based on their geographic setting. In the UK, courses in coastal regions or "Links" courses are common, and include wide undulating fairways with few trees, but gusting winds and thick areas of rough. "Parkland" courses are more frequently found in North America and continental Europe and feature narrow verdant fairways and fast greens with many wooded areas (Crowell, 2014). In some cases, courses are difficult to categorise into a specific group; rather they incorporate style elements

from both Parkland and Links. There are also several, less distinct course types such as "Heathland" – inland courses that feature the undulation and sandy soils of Links, but are well-manicured, with tree-lined fairways similar to those seen in Parkland courses. Owing to this persistent variability, suitable preparation is essential to ensure course strategy and shot practice is relevant to the constraints of the performance environment.

1.3.3.1 Pre-tournament planning

Inspecting the tournament course and gathering information prior to arrival allows golfers to identify shot-types and prepare for novel or defining course conditions (e.g., grass types) (Davies et al., 2017). With the emergence of web-based satellite imagery and mapping players can now survey the topographic features of the course from his or her home base. For many courses high-quality yardage books are available and include detailed information relating to course terrain and yardages. Players can also consult with their coach or others with experience at the course (or those of a similar design) (Pilgrim et al., 2016). For some players, their caddie may arrive prior to a tournament to assess the playing conditions and begin to develop a course strategy (Davies et al., 2017). However, most amateur level players do not have access to a full-time, professional caddie; thus, the behaviours used to develop their course strategy are likely to change as they transition to higher levels of participation (Pilgrim et al., 2016).

Web-based software programs that enable golfers to self-report statistical data using a smart phone device have become popular in recent years (James & Rees, 2008). Once collected, such data can be used to develop summary reports of performance indicators for individual clubs, distances, and completed rounds. This information may be used to determine how players perform under different conditions, and to assess relative strengths and weaknesses - allowing golfers to develop informed course strategy, and structure relevant practice activities

(Davies et al., 2017). For example, a golfer may use mapping software to survey a course and notice a predominance of 130-150m shots (based on their specific playing style). Reflecting on data from previous rounds, the player and coach may also recognise that the player tends to underperform from this distance. In response, the coach can include relevant practice drills in future practice sessions that target those priority areas leading into the tournament (Robertson & Farrow, 2018). Yet, there is limited knowledge on what proportion of players record this type of information and what proportion of those who do use it, do so effectively, and in a way that is beneficial to their performance. Upon arrival at the course both amateur and professional golfers engage in "course mapping" either before or during practice rounds to measure out the course, identify potential hazards, and to develop/refine course strategy (Pilgrim et al., 2016; Davies, et al., 2017). Practice rounds also provide an opportunity for "fine-tuning" to optimise the accuracy of course strategy and acclimatise to the specific playing conditions before competition (Davies et al., 2017). Research in other sports has also recognised the crucial role of information-gathering activities performed prior to competition. For instance, Eccles et al. (2009) observed how expert orienteers study existing maps of terrain and gather information about the constraints of an upcoming competition. Orienteers then use this information to design practice tasks to represent these constraints (Eccles et al., 2009).

1.4 Applied Frameworks and Self-Report Instruments for Sport

As knowledge and understanding of the factors that contribute to athletes' acquisition of expert performance develops, models and frameworks to guide research and applied practice continue to emerge within the literature. For example, comprehensive frameworks for the application of imagery (Martin, Moritz, & Hall, 1999) and mental toughness (Jones, Hanton, & Connaughton, 2007, p. 247) are available in sport. Research has also led to the development of frameworks relevant to coaching practice such as the Multidimensional Model of Leadership

(Challadurai, 1984) and Côté and colleagues' Coaching Model (CM) (Côté, 1998; Côté, Salmela, Trudel, Baria, & Russell,1995). For example, the CM provides information on the variables that should be considered in designing optimal learning environments for coaches (Côté, Bruner, Erickson, Strachan, & Fraser-Thomas, 2010).

1.4.1 Multidisciplinary Framework for Optimised Golf Performance

Despite the clear need for effective tournament preparation in golf, only one applied framework relevant to preparation is available in the peer-reviewed literature. Smith (2007, 2010) proposed a multidisciplinary approach to golf performance that emphasised the contributions of technical, tactical, physical, and mental skills to scoring success (see Figure 1.4). According to Smith, players must select and mobilise specific preparatory strategies to ensure that desired states (psychological, technical, tactical, physical) are reached prior to competition and maintained throughout (Smith, 2007; Smith, 2010). While this framework provides a template for players to structure their preparation, the main focus was the physical aspects of performance. Additionally, the framework does not reflect expert-consensus or evidence-based practice; rather it was developed inductively through a review of the extant literature. To fill current gaps in theory and knowledge, further research is warranted to identify the psychological, technical, and, tactical factors that contribute to optimal performance, and the strategies important for players to achieve and maintain desired states.

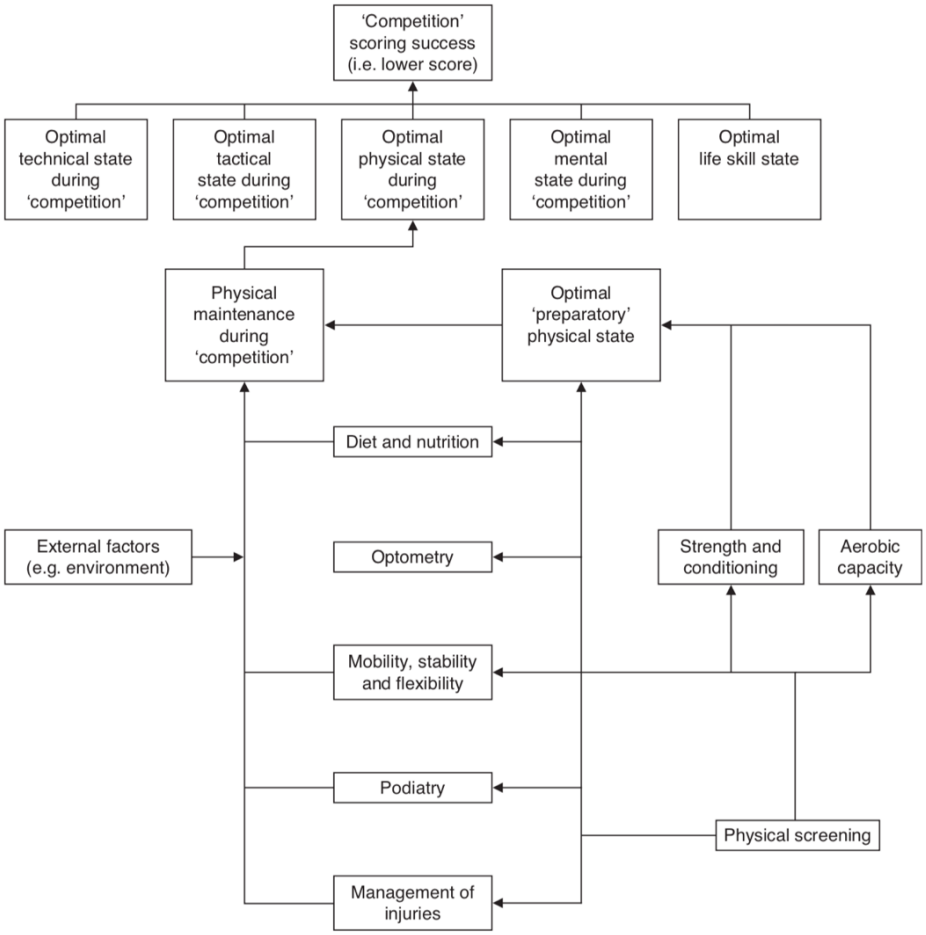


Figure 1.4. A multidisciplinary approach to golf performance enhancement (Smith, 2010).

1.4.2 Development of Consensus-based Frameworks for Tournament Preparation

To achieve widespread acceptance of any developed framework or instrument, broad consensus on content is required from key stakeholder groups (Mokkink et al., 2010). Previous research in disciplines such as medicine (Meijer, Ihnenfeldt, Vermeulen, De Haan, & Van Limbeek, 2003) and exercise and sport science (Robertson, Kremer, Aisbett, Tran, & Cerin, 2017) have used the Delphi technique to obtain consensus and develop guidelines for professional practice. The Delphi technique uses a panel of experts, responding anonymously to a series of questionnaires (i.e., rounds) with aggregate feedback used to help facilitate consensus from the panel (Hasson, Keeney, & McKenna, 2000). Thus, the Delphi represents

an iterative, multistage process used to translate expert opinion into group consensus. Delphi studies are particularly useful in areas where there is a lack of empirical evidence and established knowledge (Mokkink et al., 2010). Delphi's are also advantageous when experts live in diverse locations which could create logistical issues for research with traditional techniques (e.g., interviews) (Vernon, 2009).

While the Delphi approach has a number of desirable characteristics, there are also limitations that should be noted. For example, obtaining group consensus does not necessarily confirm that the "correct" information has been sought; thus, the validity of Delphi findings should be interpreted with some caution. Despite this critique, recent work has successfully used the Delphi to develop a hierarchy of attributes for talent identification in youth soccer (Larkin & O'Connor, 2017) and officiating in rugby (Morris & O'Connor, 2017). To improve current understanding of the behaviours that are important for tournament preparation a specific framework for use in competitive golf is needed. Such a framework could be used to refine educational curriculum and inform practice, as well as to guide further instrument development. For example, a self-report version of the framework could display practical usefulness for both applied and research purposes.

1.4.3 Development of an Instrument to Measure Golfer's Tournament Preparation Behaviours

While the development of a robust, scientific framework for tournament preparation holds promise for athlete development, it is also important that coaches and athletes have a tool to monitor the deployment of behaviours in competition scenarios (MacNamara & Collins, 2011). Taking this into consideration, this thesis outlines the development and initial validation of an instrument that can be self-administered by athletes to monitor their tournament preparation behaviours during competition. Research in other disciplines such as quality of life

research (Jensen, Abresch, & Carter, 2005), medicine (Compton, Wu, Schieffer, Pham, & Naliboff, 2008) and clinical psychology (Rytwinski et al., 2009) has led to the development of self-report versions of applied instruments and psychometric scales. There are several reasons why a self-report instrument for tournament preparation has value, including: athlete education (i.e., increased awareness of factors outside of competition or training which may influence performance; to facilitate self-regulation (encourages athletes to reflect upon preparation and provides detailed information to support this process); to orient training programs (monitoring preparatory behaviours and identifying areas for improvement to target using specific training interventions); and to support the collection of normative data (Saw, Main, & Gastin, 2015; MacNamara & Collins, 2011).

Whether an instrument has been developed for research or practical purposes, it should display appropriate measurement properties such as validity (Robertson, Burne, & Wilkie, 2013; Terwee et al., 2010). This information provides users with confidence in the quality of the instrument and the conclusions drawn from its applications (Robertson, Burnett & Wilkie, 2013). Several different types of validity can be distinguished, but those that are considered particularly relevant for evaluating instrument quality are content, criterion, and construct validity (Robertson et al., 2013; Robertson et al., 2017; Terwee et al., 2010). Content validity refers to the extent to which an instrument is an accurate representation of a given construct and is typically evaluated by content experts (Robertson et al., 2013; Terwee et al., 2010). While scientifically considered a weak method of instrument evaluation, content validity is crucial in ensuring that an instrument receives uptake in the field (Robertson & Farrow, 2018). In this thesis, content validity will be assessed by evaluating the level of agreement on item importance from experts taking part in a Delphi study.

Criterion validity provides the best evidence of instrument validity and is assessed by comparing an instrument with a "gold standard" (Terwee et al., 2010). However, if no gold standard exists construct validity can be assessed. Construct validity refers to whether an instrument adequately represents the construct it intends to measure and is inclusive of both convergent and discriminative validity (Scholtes, Terwee, & Poolman, 2010; Robertson et al., 2013). Convergent validity is the degree to which different measures of a construct that should be related, are in fact, related (Robertson et al., 2017). Thus, assessing the level of agreement between two measures of the same construct can provide an indication of convergent validity. For this doctoral thesis, players' endorsement (i.e., completion) of items from both direct observation and interviews will be compared with their self-report administration of the instrument to assess convergent validity. Specifically, if agreement between the measures is high, then it is likely the measurement error is low thus providing support for validity (Scholtes et al., 2010). Discriminant validity can be determined by comparing expected differences between relevant groups such as athletes of different performance levels. In recent years, studies in soccer (Russell, Benton, & Kingsley, 2010), volleyball (Gabbett, Georgieff, & Domrow, 2007), and golf have evaluated the ability of various technical and tactical skill tests (Robertson, Gupta, Kremer, & Burnett, 2015) to discriminate between athletes of different levels. In this thesis, the discriminant validity properties of the instrument will be determined by comparing the endorsement (i.e., completion) rates of items for players of different rankings.

1.5 Thesis Aims and Objectives

The overarching aim of this thesis was to determine the self-regulatory and task-specific behaviours important for tournament preparation in golf. Further, to develop a framework to display the relative importance of these behaviours as a function of participation level. A

second aim was to develop a self-report version of the tournament preparation framework to assess different aspects of golfers' preparation and to evaluate its measurement properties. The studies included in this thesis and their respective aims are listed below.

Chapter Two – Study I. The self-regulatory and task-specific strategies of elite amateur golfers in tournament preparation.

1. To identify the self-regulatory (metacognitive) and task-specific strategies used by elite amateur golfers before and during a tournament.
2. To determine how strategies are integrated to develop preparatory routines.

Chapter Three – Study II. The development of a tournament preparation framework for competitive golf: A Delphi study.

1. To achieve expert consensus on the relative importance of golf-specific tournament preparation items for golfers of different competitive levels.
2. To develop a framework to score and subsequently rank the importance of these behaviours to players of five competitive levels that can be used to inform and guide coaching practice.

Chapter Four – Study III. The validity of a self-report version of the tournament preparation framework (TPF-SR) for competitive golf.

1. To evaluate the validity of the Tournament Preparation Framework-Self-Report instrument.

Chapter Five – Study IV. The discriminant validity of the tournament preparation framework-self-report (TPF-SR) in amateur golfers.

1. The aim of this study was to assess the discriminant validity properties of the Tournament Preparation Framework-Self-Report instrument for golf.

REFERENCES

Abbiss C.R., & Laursen P.B. (2005). Models to explain fatigue during prolonged endurance cycling. *Sports Medicine, 35*, 865–898.

Abbott, A., & Collins, D. (2004). Eliminating the dichotomy between theory and practice in talent identification and development: Considering the role of psychology. *Journal of Sports Sciences*, *22*, 395-408.

Anderson, R., Hanrahan, S. J., & Mallett, C. J. (2014). Investigating the optimal psychological state for peak performance in Australian elite athletes. *Journal of Applied Sport Psychology*, *26*, 318-333.

Anshel, M. H. (1996). Coping styles among adolescent competitive athletes. *Journal of Social Psychology, 136,* 311–324.

Anshel, M. H., & Porter, A. (1996). Self-regulatory characteristics of competitive swimmers as a function of skill level and gender. *Journal of Sport Behaviour*, *19*, 91-110.

Anshel, M.H. (1995). An examination of self-regulatory cognitive-behavioural strategies of Australian elite and non-elite competitive male swimmers. *Australian Psychologist, 30,* 78-83.

Aoyagi, M. W., Portenga, S. T., Poczwardowski, A., Cohen, A. B., & Statler, T. (2012). Reflections and directions: The profession of sport psychology past, present, and future. *Professional Psychology: Research and Practice*, *43*, 32-38.

Araújo, D., & Davids, K. (2011). What exactly is acquired during skill acquisition? *Journal of Consciousness Studies, 18,* 7–23.

Australian Sports Commission (2018). National Sporting Organisation (NSO) Investment 2018-19. Retrieved from: https://www.sportaus.gov.au/grants_and_funding/investment_announcements

Baker, J. (2003). Early specialization in youth sport: A requirement for adult expertise? *High Ability Studies*, *14*, 85-94.

Baker, J., & Young, B. (2014). 20 years later: Deliberate practice and the development of expertise in sport. *International Review of Sport and Exercise Psychology*, *7*, 135-157.

Baker, J., Cobley, S., & Fraser-Thomas, J. (2009). What do we know about early sport specialization? Not much! *High Ability Studies*, *20*, 77-89.

Baker, J., Côté, J., & Abernethy, B. (2003). Learning from the experts: Practice activities of expert decision makers in sport. *Research Quarterly for Exercise and Sport*, *74*, 342-347.

Balyi, I., & Hamilton, A. (2004). *Long-term athlete development: Trainability in childhood and adolescence. Windows of opportunity. Optimal trainability.* Victoria, BC: National Coaching Institute British Columbia & Advanced Training and Performance.

Beauchamp, M. R., Bray, S. R., & Albinson, J. G. (2002). Pre-competition imagery, self-efficacy and performance in collegiate golfers. *Journal of Sports Sciences*, *20*, 697-705.

Beauchamp, P.H. (1999). Peak putting performance: Psychological skills and strategies utilised by PGA tour golfers. In M.R. Farrally & A.J. Cochran (Eds.), *Science and golf III: Proceedings of the world scientific congress of golf* (pp. 181-189). Champaign, IL: Human Kinetics.

Berry, J., Abernethy, B., & Côté, J. (2008). The contribution of structured activity and deliberate play to the development of expert perceptual and decision-making skill. *Journal of Sport and Exercise Psychology*, *30*, 685-708.

Bloom, B.S. (1985). *Developing talent in young people*. New York, NY: Plume.

Blumenstein, B., Lidor, R., & Tenenbaum, G. (2005). Periodization and planning of psychological preparation in elite combat sport programs: The case of judo. *International Journal of Sport and Exercise Psychology*, *3*, 7-25.

Bois, J., Sarrazin, P., Southon, J., & Boiché, J. (2009). Psychological characteristics and their relation to performance in professional golfers. *Sport Psychologist, 23,* 252-270.

Bompa, T. (1999). *Periodization: The theory and methodology of training*. Champaign, IL: Human Kinetics.

Broman, G., Johnsson, L. and Kaijser, L. (2004). Golf: A high intensity interval activity for elderly men. *Aging Clinical and Experimental Research*, *16,* 375-81.

Brooks, G. A., Fahey, T. D., & White, T. P. (1996). *Exercise physiology: Human bioenergetics and its applications*. Mountain view: Mayfield Publishing Company.

Brouwers, J., Sotiriadou, P., & De Bosscher, V. (2015). Sport-specific policies and factors that influence international success: The case of tennis. *Sport Management Review*, *18*, 343-358.

Bruner, M. W., Erickson, K., McFadden, K., & Côté, J. (2009). Tracing the origins of athlete development models in sport: A citation path analysis. *International Review of Sport and Exercise Psychology*, *2*, 23-37.

Bullock, N., Gulbin, J. P., Martin, D. T., Ross, A., Holland, T., & Marino F. E. (2009). Talent identification and deliberate programming in skeleton: Ice novice to winter Olympian in 14 months. *Journal of Sports Sciences, 27*, 397–404.

Burton, D., & Naylor, S. (2002). The Jekyll/Hyde nature of goals: Revisiting and updating goal setting research. In T. Horn (Ed.), *Advances in sport psychology* (pp. 459–499). Champaign, IL: Human Kinetics.

Carpiano, R.M., & Daley, D.M. (2006) A guide and glossary on post-positivist theory building for population health. *Journal of Epidemiology and Community Health, 60,* 564–570.

Carver, C. S. (1979). A cybernetic model of self-attention processes. *Journal of Personality and Social Psychology*, *37*, 1251-1281.

Cattell, H., & Mead, A. (2008). The sixteen-personality factor questionnaire (16PF). In G.J. Boyle, G. Matthews, & D.H. Saklofske (Eds.), *The Sage handbook of personality theory and assessment: Personality measurement and testing* (pp. 135-159). Thousand Oaks, CA: Sage.

Chelladurai, P. (1984). Discrepancy between preferences and perceptions of leadership behaviour and satisfaction of athletes in varying sports. *Journal of Sport Psychology*, *6*, 27-41.

Chidester, T. R., & Grigsby, C.W. (1984). A meta-analysis of the goal setting-performance literature. In J.A. Pearce, & R. B. Robinson (Eds.), *Academy of management proceedings* (pp. 202–206). Ada, OH: Academy of management.

Chow, J.Y., Davids, K., Hristovski, R., Araújo, D., & P. Passos. (2011). Nonlinear pedagogy: Learning design for self-organizing neurobiological systems. *New Ideas in Psychology, 29*, 189–200.

Cleary, T. J., & Zimmerman, B. J. (2001). Self-regulation differences during athletic practice by experts, non-experts, and novices. *Journal of Applied Sport Psychology*, *13*, 185-206.

Cleary, T. J., Callan, G., & Zimmerman, B. J. (2012). Assessing self-regulation as a cyclical, context-specific phenomenon: Overview and analysis of SRL microanalytic protocols. *Education Research International*, 1-19.

Cleary, T. J., Zimmerman, B. J., & Keating, T. (2006). Training physical education students to self-regulate during basketball free throw practice. *Research Quarterly for Exercise and Sport, 77*, 251-262.

Close, G.L., Pugh, J., & Morton, J.P. (2018). Nutrition for golf. In M. Toms (Ed.), *Routledge international handbook of golf science* (pp. 357-368). New York, NY: Routledge.

Cockerill, I.M. (1968). Personality and golfing ability. *Research Papers in Physical Education, 6,* 18-22.

Cohn, P.J. (1991). An exploratory study on peak performance in golf. *The Sport Psychologist, 5,* 1-14.

Compton, P.A., Wu, S.M., Schieffer, B., Pham, Q., & Naliboff, B.D. (2008). Introduction of a self-report version of the prescription drug use questionnaire and relationship to medication agreement noncompliance. *Journal of Pain and Symptom Management, 36,* 383-395.

Côté, J. (1998). Coaching research and intervention: An introduction to the special issue. *Avante, 4,* 1-15.

Côté, J. (1999). The influence of the family in the development of talent in sport. *The Sport Psychologist*, *13*, 395-417.

Côté, J., & Fraser-Thomas, J. (2007). Youth involvement in sport. In P. Crocker (Ed.), *Introduction to sport psychology: A Canadian perspective* (pp. 266–294). Toronto: Pearson Prentice Hall.

Côté, J., & Vierimaa, M. (2014). The developmental model of sport participation: 15 years after its first conceptualization. *Science & Sports*, *29*, 63-69.

Côté, J., Bruner, M., Erickson, K., Strachan, L., & Fraser-Thomas, J. (2010). Athlete development and coaching. In J. Lyle, & C. Cushion (Eds.), *Sport coaching: Professionalism and practice* (pp. 63-83). Oxford, UK: Elsevier.

Côté, J., Murphy-Mills, J., & Abernethy, B. (2012). The development of skill in sport. In A.M. Williams, & N.J. Hodges (Eds.) *Skill acquisition in sport: Research, theory, and practice* (pp. 269-286). London: Routledge.

Côté, J., Salmela, J., Trudel, P., Baria, A., & Russell, S. (1995). The coaching model: A grounded assessment of expert gymnastic coaches' knowledge. *Journal of Sport and Exercise Psychology*, *17,* 1-17.

Coté, J., Yardley, J., Hay, J., Sedgwick, W. & Baker, J. (1999). An exploratory examination of the coaching behaviour scale for sport. *Avante, 5,* 89-92.

Cotterill, S.T., Sanders, R., & Collins, D. (2010). Developing effective pre-performance routines in golf: Why don't we ask the golfer? *Journal of Applied Sport Psychology, 22,* 51-64.

Crowell, B. (2014). *Golf.* New York, NY: Penguin Group Inc.

Davids, K., Araújo, D., Shuttleworth, R., & Button, C. (2003). Acquiring skill in sport: A constraints-led perspective. *International Journal of Computer Sciences in Sport*, *2*, 31–39.

Davids, K., Button, C., & Bennett, S.J. (2008). *Dynamics of skill acquisition: A constraints-led approach.* Champaign, IL: Human Kinetics.

Davies, T., Collins, D., & Cruickshank, A. (2014). So, what do we do with the rest of the day? Going beyond the pre-shot routine in professional golf. *International Journal of Golf Science, 2,* 163-175.

Davies, T., Collins, D., & Cruickshank, A. (2017). This is what we do with the rest of the day! Exploring the macro and meso-levels of elite golf performance. *The Sport Psychologist, 31,* 117-128.

Davies, T., Cruickshank, A., & Collins, D. (2017). This is really what we do with the rest of the day! Checking and clarifying what high-level golfers do during the meso-level of performance. *The Sport Psychologist, 31*, 382-395.

Doan, B. K., Newton, R. U., Kwon, Y. H., & Kraemer, W. J. (2006). Effects of physical conditioning on intercollegiate golfer performance. *Journal of Strength and Conditioning Research*, *20*, 62-72.

Eccles, D. W., Ward, P., & Woodman, T. (2009). Competition-specific preparation and expert performance. *Psychology of Sport and Exercise, 10,* 96–107.

Egret, C. I., Vincent, O., Weber, J., Dujardin, F. H., & Chollet, D. (2003). Analysis of 3D kinematics concerning three different clubs in golf swing. *International Journal of Sports Medicine, 24,* 465-470.

Elferink-Gemser, M., Visscher, C., & Lemmink, K. (2008). Differences in psychological skills between elite and sub-elite youth athletes. *Journal of Physical Education and Sport Sciences, 4,* 95-105.

Ericsson, K. A. (2006). The influence of experience and deliberate practice on the development of superior expert performance. In K. A. Ericsson, N. Charness, R. R. Hoffman, & P. J. Feltovich (Eds.), *The Cambridge handbook of expertise and expert performance* (pp. 39 – 68). New York, NY: Cambridge University Press.

Ericsson, K. A., Krampe, R. T., & Tesch-Römer, C. (1993). The role of deliberate practice in the acquisition of expert performance. *Psychological Review, 100,* 363-406.

Ertmer, P. A., & Newby, T. J. (1996). The expert learner: Strategic, self-regulated, and reflective. *Instructional Science, 24,* 1-24.

Evans, K., & Tuttle, N. (2015). Improving performance in golf: Current research and implications from a clinical perspective. *Brazilian Journal of Physical Therapy, 19*, 381-389.

Farrally, M. R., Cochran, A. J., Crews, D. J., Hurdzan, M. J., Price, R. J., Snow, J. T., & Thomas, P. R. (2003). Golf science research at the beginning of the twenty-first century. *Journal of Sports Sciences*, *21*, 753-765.

Farrow, D., Baker, J., & MacMahon, C. (2013) *Developing sport expertise: Researchers and coaches put theory into practice*. Oxford, UK: Routledge.

Finn, J. (2009). Using mental skills to improve golfing performance: A theory-based case study for golf coaches. *Annual Review of Golf Coaching*, *4,* 223-245.

Ford, P., De Ste Croix, M., Lloyd, R., Meyers, R., Moosavi, M., Oliver, J…Williams, C. (2011). The long-term athlete development model: Physiological evidence and application. *Journal of Sports Sciences*, *29*, 389-402.

Ford, P.R., Coughlan, E.K., Hodges, N.J., & Williams, A.M. (2017). Deliberate practice in sport. In J. Baker, & D. Farrow (Eds.), *Routledge handbook of sport expertise* (pp. 347-362). New York, NY: Routledge.

Fradkin, A. (2012). Describing the epidemiology of female golfing injuries. *International Journal of Golf Science, 1 (Supplement),* S19-20.

Fradkin, A. (2018). Golf injuries. In M. Toms (Ed.), *Routledge international handbook of golf science* (pp. 346-354). New York, NY: Routledge.

Fradkin, A. & Eisenhart, C. (2011). To practice or to play? Is golf participation associated with an increased risk of injury? *Medicine & Science in Sports & Exercise*, *43*, 357.

Fradkin, A. J., Sherman, C. A., & Finch, C. F. (2004). Improving golf performance with a warm up conditioning programme. *British Journal of Sports Medicine, 38*, 762–765.

Fradkin, A.J., Cameron, P.A., & Gabbe, B.J. (2007). Is there an association between self-reported warm-up behaviour and golf related injury in female golfers? *Journal of Science and Medicine in Sport, 10,* 66-71.

Fradkin, A.J., Zazryn, T.T., & Smoliga, J.M. (2010). Effects of warming-up on physical performance: A systematic review with meta-analysis. *The Journal of Strength and Conditioning Research, 24,* 140-148.

Gabbett, T., Georgieff, B., & Domrow, N. (2007). The use of physiological, anthropometric, and skill data to predict selection in a talent-identified junior volleyball squad. *Journal of Sports Sciences,* 25, 1337-1344.

Gergley, J. C. (2009). Acute effects of passive static stretching during warm-up on driver clubhead speed, distance, accuracy, and consistent ball contact in young male competitive golfers. *The Journal of Strength and Conditioning Research, 23,* 863–867.

Glazier, P. S. (2010). Game, set and match? Substantive issues and future directions in performance analysis. *Sports Medicine, 40,* 625–634.

Glazier, P. S. (2017). Towards a grand unified theory of sports performance. *Human Movement Science*, *56*, 139-156.

Golf Australia. (2014). *National athlete pathway framework*.

Gordan, S., & Nair, J. (2018). Positive psychology of golf. In M. Toms (Ed.), *Routledge international handbook of golf science* (pp. 183-195). New York, NY: Routledge.

Gould, D., & Tuffey, S. (1996). Zones of optimal functioning research: A review and critique. *Anxiety, Stress, and Coping: An International Journal, 9,* 53–68.

Graham, D. J. (1982). *A discriminant analysis of personality variables for champion and nonchampion professional women golfers* (Unpublished doctoral dissertation, United States International University).

Green, M., & Houlihan, B. (2006). Governmentality, modernization, and the "disciplining" of national sporting organizations: Athletics in Australia and the United Kingdom. *Sociology of Sport Journal*, *23*, 47-71.

Gupta, L., Morgan, K., & Gilchrist, S. (2017). Does elite sport degrade sleep quality? A systematic review. *Sports Medicine, 47,* 1317–1333.

Gulbin, J. P., Croser, M. J., Morley, E. J., & Weissensteiner, J. R. (2013). An integrated framework for the optimisation of sport and athlete development: A practitioner approach. *Journal of Sports Sciences, 31,* 1319-1331.

Hall, H.K., & Kerr, A.W. (2001). Goal setting in sport and physical activity: Tracing empirical developments and establishing conceptual direction. In G.C. Roberts (Ed.), *Advances in motivation in sport and exercise* (pp. 183-234). Champaign, IL: Human Kinetics.

Halson, S.L., & Jeukendrup A.E. (2004). Does overtraining exist? An analysis of overreaching and overtraining research. *Sports Medicine, 34*, 967–81.

Hanin, Y. L. (1997). Emotions and athletic performance: Individual zones of optimal functioning model. *European Yearbook of Sport Psychology, 1,* 29–72.

Hanin, Y. L. (2000). Individual zones of optimal functioning (IZOF) model: Emotion–performance relationships in sport. In Y. L. Hanin (Ed.), *Emotions in sport* (pp. 65–89). Champaign, IL: Human Kinetics.

Hardy, L., Jones, G., & Gould, D. (1996). A unifying model of psychological preparation for peak athletic performance. In L. Hardy, G. Jones, & D. Gould (Eds.), *Understanding psychological preparation for sport: Theory and practice of elite performers* (pp. 239–248). Hoboken, NJ: Wiley.

Hardy, L., Roberts, R., Thomas, P. R., & Murphy, S. M. (2010). Test of Performance Strategies (TOPS): Instrument refinement using confirmatory factor analysis. *Psychology of Sport and Exercise*, *11*, 27-35.

Harmison, R. J. (2011). Peak performance in sport: Identifying ideal performance states and developing athletes' psychological skills. *Sport, Exercise, and Performance Psychology, 1,* 3-18.

Harmison, R.J., & Casto, K.V. (2012). Optimal performances: Elite level performance in "the zone." In S. Murphy (Ed.), *The Oxford handbook of sport and performance psychology* (pp. 707-725). New York, NY: Oxford University Press.

Hasson, F., Keeney, S., & McKenna, H. (2000). Research guidelines for the Delphi survey technique. *Journal of Advanced Nursing, 32,* 1008–1015.

Hayslip, B., Petrie, T.A., MacIntire, M.M., & Jones, G.M. (2010). The influences of skill level, anxiety, and psychological skills use on amateur golfers' performances. *Journal of Applied Sport Psychology, 22,* 123-133.

Heaney, S., O'Connor, H., Naughton, G., & Gifford, J. (2008). Towards an understanding of the barriers to good nutrition for elite athletes. *International Journal of Sports Science and Coaching, 3*, 391–401.

Hellström, J. (2009a). Competitive elite golf. *Sports Medicine, 39*, 723-741.

Hellström, J. (2009b). Psychological hallmarks of skilled golfers. *Sports Medicine, 39,* 854-855.

Hill, J., Howatson, G., Van Someren, K., Leeder, J., & Pedlar, C. (2014). Compression garments and recovery from exercise-induced muscle damage: A meta-analysis. *British Journal of Sports Medicine*, *48*, 1340-1346.

Hong, E. (1995). A structural comparison between state and trait self-regulation models. *Applied Cognitive Psychology*, *9*, 333-349.

Hosea, T.M., Gatt, C.J., Galli, K.M., Langrana, N.A., & Zawadsky, J.P. (1990). Biomechanical analysis of the golfer's back. In A.J. Cochran (Ed), *Science and golf: Proceedings of the world scientific congress of golf* (pp. 43-48). London, UK: Chapman and Hall.

Hristovski, R., Davids, K., & Araújo, D. (2009). Information for regulating action in sport: Metastability and emergence of tactical solutions under ecological constraints. In D. Araújo, H. Ripoll, & M. Raab (Eds.), *Perspectives on cognition and action in sport* (pp. 43– 57), New York, NY: Nova Science.

Hume, P. A., Keogh, J., & Reid, D. (2005). The role of biomechanics in maximising distance and accuracy of golf shots. *Sports Medicine*, *35*, 429-449.

Hummon, N.P., & Doreian, P. (1990). Computational methods for social network analysis. *Social Networks, 12,* 273-288.

Issurin, V. B. (2010). New horizons for the methodology and physiology of training periodization. *Sports Medicine*, *40*, 189-206.

James, N., & Rees, G.D. (2008). Approach shot accuracy as a performance indicator for US PGA tour professionals. *International Journal of Sports Science and Coaching, 3,* 145-160.

Jensen, M.P., Abresch, R.T., & Carter, G.T. (2005). The reliability and validity of a self-report version of the FIM instrument in persons with neuromuscular disease and chronic pain. *Archives of Physical Medicine and Rehabilitation, 86*, 116-22.

Johnston-O'Connor, E. J., & Kirschenbaum, D. S. (1986). Something succeeds like success: Positive self-monitoring for unskilled golfers. *Cognitive Therapy and Research*, *10*, 123-136.

Jones, G., Hanton, S., & Connaughton, D. (2007). A framework of mental toughness in the world's best performers. *The Sport Psychologist*, *21*, 243-264.

Jonker, L., Elferink-Gemser, M.T., & Visscher, C. (2010). Differences in self-regulatory skills among talented athletes: The significance of competitive level and type of sport. *Journal of Sports Sciences, 28,* 901-908.

Kingston, K. M., & Hardy, L. (1997). Effects of different types of goals on processes that support performance. *The Sport Psychologist*, *11*, 277-293.

Kirschenbaum, D. S., & Bale, R.M. (1980). Cognitive-behavioural skills in golf: Brain power golf. In R.M. Suinn (Ed.), *Psychology in sports: Methods and application* (pp. 334-343). Minneapolis, MN: Burgess.

Kirschenbaum, D. S., Owens. D., & O'Connor, E. A. (1998). Smart golf: Preliminary evaluation of a simple, yet comprehensive, approach to improving and scoring the mental game. *The Sport Psychologist, 12,* 271–282.

Kitsantas, A., & Zimmerman, B. J. (2002). Comparing self-regulatory processes among novice, non-expert, and expert volleyball players: A microanalytic study. *Journal of Applied Sport Psychology, 14,* 91-105.

Kölling, S., Duffield, R., Erlacher, D., Venter, R., & Halson, S. L. (2019). Sleep-related issues for recovery and performance in athletes. *International Journal of Sports Physiology and Performance*, *14*, 144-148.

Krane, V., & Williams, J. M. (2006). Psychological characteristics of peak performance. In J. M. Williams (Ed.), *Applied sport psychology: Personal growth to peak performance* (pp. 207–227). New York, NY: McGraw-Hill.

Kyllo, L. B., & Landers, D. M. (1995). Goal setting in sport and exercise: A research synthesis to resolve the controversy. *Journal of Sport and Exercise Psychology, 17*, 117-137.

Larkin, P., & O'Connor, D. (2017). Talent identification and recruitment in youth soccer: Recruiter's perceptions of the key attributes for player recruitment. *PLoS ONE*, *12*, e0175716.

Lazarus, R. S. (2000). How emotions influence performance in competitive sports. *The Sport Psychologist*, *14,* 229-252.

Lazarus, R. S., & Folkman, S. (1984). *Stress, appraisal and coping*. New York, NY: Springer.

Leeder, J., Gissane, C., Someren, K., Gregson, W., & Howatson, G. (2012). Cold water immersion and recovery from strenuous exercise: A meta-analysis. *British Journal of Sports Medicine, 46,* 233-240.

Locke, E. A., & Latham, G. P. (1985). The application of goal setting to sports. *Journal of Sports Psychology, 7,* 205–222.

Locke, E. A., & Latham, G. P. (1990). *A theory of goal setting and task performance*. Englewood Cliffs, NJ: Prentice Hall.

Locke, E. A., & Latham, G. P. (2002). Building a practically useful theory of goal setting and task motivation. A 35-year odyssey. *American Psychologist, 57,* 705–717.

Locke, E. A., & Latham, G. P. (2006). New directions in goal-setting theory. *Current Directions in Psychological Science*, *15*, 265-268.

MacNamara, Á., & Collins, D. (2011). Development and initial validation of the psychological characteristics of developing excellence questionnaire. *Journal of Sports Sciences*, *29*, 1273-1286.

MacNamara, Á., Button, A., & Collins, D. (2010). The role of psychological characteristics in facilitating the pathway to elite performance. Part 1: Identifying mental skills and behaviours. *The Sport Psychologist*, *24*, 52-73.

Manfredini, R., Manfredini, F., Fersini, C., & Conconi, F. (1998). Circadian rhythms, athletic performance, and jet lag. *British Journal of Sports Medicine, 32,* 101–106.

Marriott, L., & Nilsson, P. (2011). *Play your best golf now.* New York, NY: Gotham.

Martin, K. A., Moritz, S. E., & Hall, C. R. (1999). Imagery use in sport: A literature review and applied model. *The Sport Psychologist*, *13*, 245-268.

McCaffrey, N., & Orlick, T. (1989). Mental factors related to excellence among top professional golfers. *International Journal of Sport Psychology, 20*, 256-278.

McGinnis, P. M., & Newell, K. M. (1982). Topological dynamics: A framework for describing movement and its constraints. *Human Movement Science, 1,* 289–305.

McPherson, S. L. (1999). Tactical differences in problem representations and solutions in collegiate varsity and beginner female players. R*esearch Quarterly for Exercise and Sport, 70,* 369–384.

Meijer, R., Ihnenfeldt, D., Vermeulen, M., De Haan, R., & Van Limbeek, J. (2003). The use of a modified Delphi procedure for the determination of 26 prognostic factors in the sub-acute stage of stroke. *International Journal of Rehabilitation Research, 26*, 265–270.

Mellalieu, S.D., Neil, R., Hanton, S., & Fletcher, D. (2009). Competition stress in sport performers: Stressors experienced in the competition environment. *Journal of Sports Sciences, 27,* 729-744.

Mokkink, L. B., Terwee, C. B., Patrick, D. L., Alonso, J., Stratford, P. W., Knol, D. L., ... de Vet, H. C. (2010). The COSMIN checklist for assessing the methodological quality of studies on measurement properties of health status measurement instruments: An international Delphi study. *Quality of Life Research, 19,* 539–549.

Morris, G., & O'Connor, D. (2017). Key attributes of expert NRL referees. *Journal of Sports Sciences, 35*, 852–857.

Morris, T. (1995). Psychological characteristics and sports behaviour. In T. Morris, & J. Summers (Eds.), *Sport psychology: Theory*, *applications and issues* (pp. 3-28). Brisbane, QLD: Jacaranda Wiley.

Newell, K. M., van Emmerik, R. E. A., & McDonald, P. V. (1989). Biomechanical constraints and action theory: Reaction to G.J. van Ingen Schenau. *Human Movement Science, 8*, 403–409.

Nicholls, A. R. (2007). A longitudinal phenomenological analysis of coping effectiveness among Scottish international adolescent golfers. *European Journal of Sport Science, 7,* 169-178.

Nicholls, A. R., Holt, N. L., & Polman, R. C. (2005). A phenomenological analysis of coping effectiveness in golf. *The Sport Psychologist, 19,* 111-130.

Nicholls, A. R., Holt, N. L., Polman, R. C., & James, D. W. G. (2005). Stress and coping among international adolescent golfers. *Journal of Applied Sport Psychology*, *17*, 333-340.

Nicholls, A.R., & Polman, R.C.J. (2007). Coping in sport: A systematic review. *Journal of Sports Sciences, 25,* 11-31.

Panadero, E. (2017). A review of self-regulated learning: Six models and four directions for research. *Frontiers in Psychology, 8*, 422.

Panadero, E., & Alonso-Tapia, J. (2014). How do students self-regulate? Review of Zimmerman's cyclical model of self-regulated learning. *Anales De Psicologia, 30*, 450-462.

Peltier, J. W., Hay, A., & Drago, W. (2006). Reflecting on reflection: Scale extension and a comparison of undergraduate business students in the United States and the United Kingdom. *Journal of Marketing Education*, *28*, 5-16.

Pervin, L. A., & Cervone, D. (2010). *Personality: Theory and research*. New York, NY: Wiley.

Pilgrim, J., Kremer, P., & Robertson, S. (2016). A qualitative investigation into the role of the caddie in elite-level golf. *International Journal of Sports Science & Coaching, 11*, 599-609.

Pinder, R. A., Davids, K., Renshaw, I., & Araújo, D. (2011). Representative learning design and functionality of research and practice in sport. *Journal of Sport and Exercise Psychology*, *33*, 146-155.

Pinder, R. A., Renshaw, I., & Davids, K. (2013). The role of representative design in talent development: A comment on "Talent identification and promotion programmes of Olympic athletes". *Journal of Sports Sciences*, *31*, 803-806.

Pintrich, P. R. (1995). Understanding self-regulated learning. *New Directions for Teaching and Learning*, *1995*, 3-12.

Pintrich, P. R. (2000). The role of goal orientation in self-regulated learning. In M. Boekaerts, P.R. Pintrich, & M. Zeidner (Eds.), *Handbook of self-regulation (*pp. 451–502). San Diego, CA: Academic Press.

Pintrich, P. R., & De Groot, E. V. (1990). Motivational and self-regulated learning components of classroom academic performance. *Journal of Educational Psychology*, *82*, 33-40.

Privette, G. (1983). Peak experience, peak performance, and flow: A comparative analysis of positive human experiences. *Journal of Personality and Social Psychology*, *45*, 1361–1368.

Puustinen, M., & Pulkkinen, L. (2001). Models of self-regulated learning: A review. *Scandinavian Journal of Educational Research*, *45*, 269-286.

Pyne, D. B., Mujika, I., & Reilly, T. (2009). Peaking for optimal performance: Research limitations and future directions. *Journal of Sports Sciences*, *27*, 195-202.

Raglin, J. S., & Hanin, Y. L. (2000). Competitive anxiety. In Y. L. Hanin (Ed.), *Emotions in sport* (pp. 93–111). Champaign, IL: Human Kinetics.

Reilly, T., Atkinson, G., Edwards, B., Waterhouse, J., Åkerstedt, T., Davenne, D., ... Wirz-Justice, A. (2007). Coping with jet-lag: A position statement for the European college of sport science. *European Journal of Sport Science, 7,* 1–7.

Reilly, T., Waterhouse, J., Burke, L. M., & Alonso, J. M. (2007). Nutrition for travel. *Journal of Sports Sciences, 25,* 125-134.

Robertson, S. J., Burnett, A. F., & Wilkie, J. (2013). Tests examining skill outcomes in sport: A systematic review of measurement properties and feasibility. *Sports Medicine, 44,* 501-518.

Robertson, S., & Farrow, D. (2018). Designing optimal golf practice environments. In M. Toms (Ed.), *Routledge international handbook of golf science* (pp. 139-150). New York, NY: Routledge.

Robertson, S., Gupta, S., Kremer, P., & Burnett, A.F. (2015). Development and measurement properties of a putting skill test for high-level golf. *European Journal of Sport Science*, *15,* 125-133.

Robertson, S., Kremer, P., Aisbett, B., Tran, J., & Cerin, E. (2017). Consensus on measurement properties and feasibility of performance tests for the exercise and sport sciences: A Delphi study. *Sports Medicine Open*, *3,* 1-10.

Russell, M., Benton, D., & Kingsley, M. (2010). Reliability and construct validity of soccer skills tests that measure passing, shooting, and dribbling. *Journal of Sports Sciences, 28*, 1399-1408.

Rytwinski, N.K., Fresco, D.M., Heimberg, R.G., Coles, M.E., Liebowitz, M.R., Cissell, S., Stein, M.B., & Hofmann, S.G. (2009). Screening for social anxiety disorder with the

self-report version of the Liebowitz social anxiety scale. *Depression & Anxiety, 26*, 34-38.

Sam, M. (2012). Targeted investments in elite sport funding: Wiser, more innovative and strategic? *Managing Leisure*, *17*, 207-220.

Saw, A. E., Main, L. C., & Gastin, P. B. (2016). Monitoring the athlete training response: Subjective self-reported measures trump commonly used objective measures: A systematic review. *British Journal of Sports Medicine*, *50*, 281-291.

Scholtes, V.A., Terwee, C.B., & Poolman, R.W. (2011). What a makes a measurement instrument valid and reliable. *Injury, 42*, 236-240.

Silva, M.R., Paiva, T. (2016). Poor precompetitive sleep habits, nutrients' deficiencies, inappropriate body composition and athletic performance in elite gymnasts. *European Journal of Sport Science, 16,* 726–735.

Smith, D. J. (2003). A framework for understanding the training process leading to elite performance. *Sports Medicine*, *33*, 1103-1126.

Smith, M. (2007). Physical preparation for golf: Strategies for optimising movement potential. *International Journal of Sports Science and Coaching, 2,* 151-166.

Smith, M. F., Newell, A. J., & Baker, M. R. (2012). Effect of acute mild dehydration on cognitive-motor performance in golf. *The Journal of Strength & Conditioning Research, 26,* 3075–3080.

Smith, M.F. (2010). The role of physiology in the development of golf performance. *Sports Medicine, 40,* 635-655.

Tan, C. W. K., Chow, J. Y., & Davids, K. (2012). 'How does TGfU work?': Examining the relationship between learning design in TGfU and a nonlinear pedagogy. *Physical Education and Sport Pedagogy*, *17*, 331-348.

Terwee, C. B., Mokkink, L. B., van Poppel, M. N., Chinapaw, M. J., van Mechelen, W., & de Vet, H. C. (2010). Qualitative attributes and measurement properties of physical activity questionnaires. *Sports Medicine*, *40*, 525-537.

Thériault. G., & Lachance, P. (1998). Golf injuries: An overview. *Sports Medicine, 2,* 43-57.

Thomas, O., Hanton, S., & Maynard, I. (2007). Anxiety responses and psychological skill use during the time leading up to competition: Theory to practice I. *Journal of Applied Sport Psychology*, *19*, 379-397.

Thomas, P. R., Murphy, S. M., & Hardy, L. E. W. (1999). Test of performance strategies: Development and preliminary validation of a comprehensive measure of athletes' psychological skills. *Journal of Sports Sciences*, *17*, 697-711.

Toering, T.T., Elferink-Gemser, M.T., Jordet, G., & Visscher, C. (2009). Self-regulation and performance level of elite and non-elite youth soccer players. *Journal of Sports Sciences, 27*, 1509-1517.

Toms, M. (2018). Editor's introduction. In M. Toms (Ed.), *Routledge international handbook of golf science* (pp. xxi-xxii). New York, NY: Routledge.

Tucker, R., & Collins, M. (2012). What makes champions? A review of the relative contribution of genes and training to sporting success. *British Journal of Sports Medicine, 46*, 555–561.

Vaeyens, R., Güllich, A., Warr, C. R., & Philippaerts, R. (2009). Talent identification and promotion programmes of Olympic athletes. *Journal of Sports Sciences*, *27*, 1367-1380.

Vaile, J., Halson, S., & Graham, S. (2010). Recovery review: Science vs. practice. *Journal of Australian Strength & Conditioning*, *Supplement 2*, 5-21.

Vealey, R.S. (1992). Personality and sport: A comprehensive view. In T.S. Horn (Ed.), *Advances in sport psychology* (pp. 25-59). Champaign, IL: Human Kinetics.

Vernon, W. (2009). The Delphi technique: A review. *International Journal of Therapy and Rehabilitation*, *16*, 69-76.

Versey, N.G., Halson, S.L., & Dawson, B.T. (2013). Water immersion recovery for athletes: Effect on exercise performance and practical recommendations. *Sports Medicine, 43,* 1101-1130.

Vilar, L., Araújo, D., Davids, K., & Button, C. (2012). The role of ecological dynamics in analysing performance in team sports. *Sports Medicine*, *42*, 1-10.

Ward, P., Hodges, N. J., Starkes, J. L., & Williams, M. A. (2007). The road to excellence: Deliberate practice and the development of expertise. *High Ability Studies*, 18, 119-153.

Wells, G. D., Elmi, M., & Thomas, S. (2009). Physiological correlates of golf performance. *The Journal of Strength & Conditioning Research*, *23*, 741-750.

Winne, P. H. (1996). A metacognitive view of individual differences in self-regulated learning. *Learning and Individual Differences, 8,* 327–353.

Winne, P. H., & Hadwin, A. F. (1998). Studying as self-regulated engagement in learning. In D. Hacker, J. Dunlosky, & A. Graesser (Eds.), *Metacognition in educational theory and practice* (pp. 277-304). Hillsdale, NJ: Erlbaum.

Wood, R. E., Mento, A. J., & Locke, E. A. (1987). Task complexity as a moderator of goal effects: A meta-analysis. *Journal of Applied Psychology, 72*, 416-425.

Woodman, T., & Hardy, L. (2001). A case study of organizational stress in elite sport. *Journal of Applied Sport Psychology, 13*, 207- 238.

Woodman, T., Zourbanos, N., Hardy, L., Beattie, S., & McQuillan, A. (2010). Do performance strategies moderate the relationship between personality and training behaviours? An exploratory study. *Journal of Applied Sport Psychology*, *22*, 183-197.

Zimmerman, B. J. (1989). A social cognitive view of self-regulated academic learning. *Journal of Educational Psychology*, *81*, 329-339.

Zimmerman, B. J., & Campillo, M. (2003). Motivating self-regulated problem solvers. In J. E. Davidson, & R. J. Sternberg (Eds.), *The psychology of problem solving* (pp. 233-262). Cambridge, UK: Cambridge University Press.

Zimmerman, B. J., & Moylan, A. R. (2009). Self-regulation: Where metacognition and motivation intersect. In D. J. Hacker, J. Dunlosky, & A. C. Graesser (Eds.), *Handbook of metacognition in education* (pp. 299–315). New York, NY: Routledge.

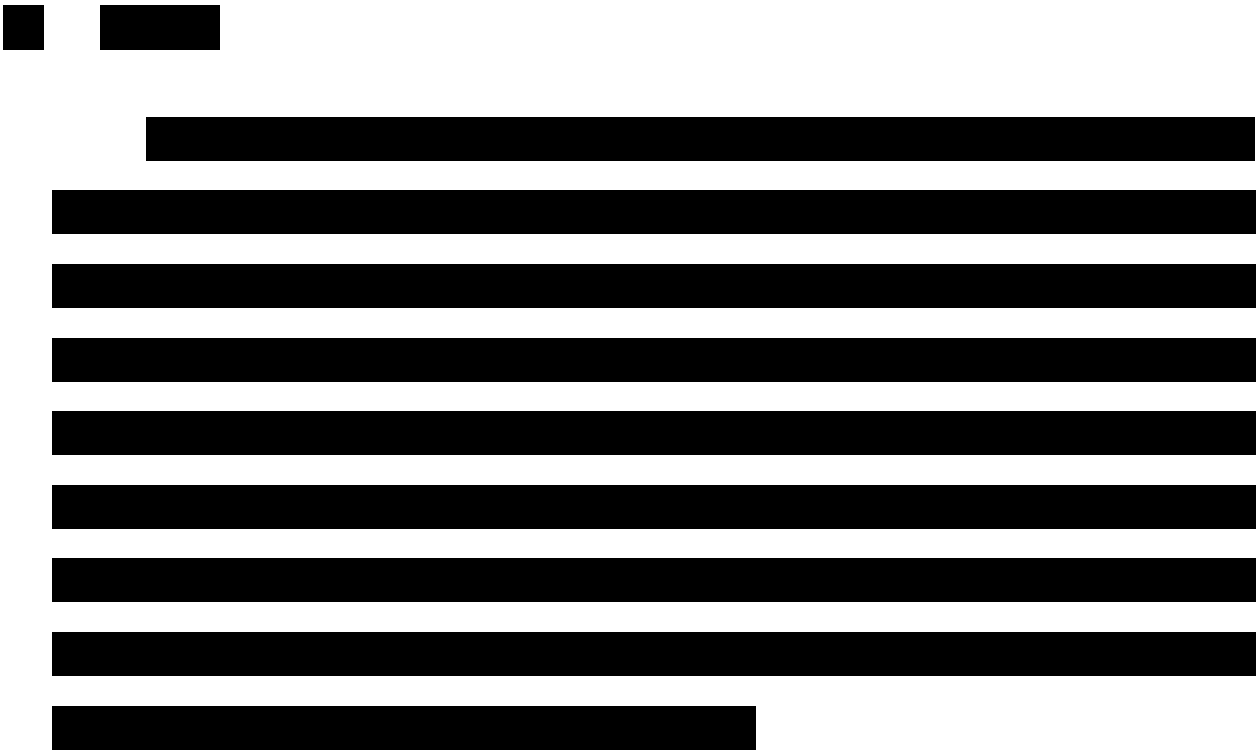
Zimmerman, B.J. (2000). Attainment of self-regulation: A social cognitive perspective. In M. Boekaerts, P.R. Pintrich, & M. Zeidner (Eds.), *Handbook of self-regulation* (pp. 13-39). San Diego, CA: Academic Press.

Zimmerman, B.J. (2006). Development and adaptation of expertise: The role of self-regulatory processes and beliefs. In A. Ericsson, N. Charness, P. Feltovich, & R. Hoffman (Eds.), *The Cambridge handbook of expertise and expert performance* (pp. 705-722). New York, NY: Cambridge University Press.

2 CHAPTER TWO - STUDY I

The self-regulatory and task-specific strategies of elite amateur golfers in tournament preparation.

Pilgrim, J., Kremer, P., & Robertson, S. (2018). The self-regulatory and task-specific strategies of elite-level amateur golfers in tournament preparation. *The Sport Psychologist, 32,* 169-177.



3 CHAPTER THREE – STUDY II

The development of a tournament preparation framework for competitive golf: A Delphi study.

Pilgrim, J., Kremer, P., & Robertson, S. (2018). The development of a tournament preparation framework for competitive golf: A Delphi study. *The European Journal of Sports Science, 18,* 930-939.

3.1 Abstract

Tournament preparation in golf is used by players to increase course knowledge, develop strategy, optimise playing conditions and facilitate self-regulation. It is not known whether specific behaviours in tournament preparation should be given priority in education and practice at different stages of competition. This study aimed to achieve consensus on the importance of specific tournament preparation behaviours or "items" to players of five competitive levels. A two-round Delphi study was used, including an expert panel of 36 coaches, high-performance staff, players and academics. Participants were asked to score the relative importance of 48 items to players using a 5-point Likert-type scale. For an item to achieve consensus, 67% agreement was required in two adjacent score categories. Consensus was reached for 46 items and these were used to develop a ranked framework for each competitive level. The developed framework provides consensus-based guidelines of the behaviours that are perceived as important in tournament preparation. This framework could be used by national sport organisations to guide the development of more comprehensive learning environments for players and coaches. It could also direct future studies examining the critical behaviours for golfers across different competitive levels.

3.2 Introduction

There is considerable research on factors important for elite performance in golf. Recent studies have focused on the technical and physical components of the swing (Hellström, 2009a; Hume, Keogh, & Reid, 2005; Smith, 2010), the psychological qualities and processes associated with optimal performance (Bois, Sarrazin, Southon, & Boiché, 2009; Cotterill, Sanders, & Collins, 2010; Hellström, 2009b; Hill, Hanton, Matthews, & Fleming, 2011), as well as the developmental and contextual factors that could be important to achieve elite status (Hayman, Polman, Taylor, Hemmings, & Borkoles, 2011). Other components of performance, such as tournament preparation have received less attention, despite potential importance. Tournament preparation can be defined as the mental and behavioural elements, and strategies that prepare players for competition (Pilgrim, Kremer, & Robertson, 2018). Tournament preparation can be represented by three periods: (1) the pre-tournament period (generally one week before until the first round of competition but can also include preparatory activities and behaviours that may occur several weeks or months prior to competition); (2) the tournament period; (3) the post-tournament period (the last round of competition until the next tournament or return to normal training) (Pilgrim et al., 2018). Among elite amateur and professional players, behaviours that are important for success in tournament preparation include strategies to structure and implement preparation, develop a course strategy, optimise playing conditions and facilitate effective self-regulation (McCaffrey & Orlick, 1989; Pilgrim et al., 2018). Professional golfers also use structured pre-tournament practice to enhance swing consistency, establish confidence and improve ball striking (Douglas & Fox, 2002). Currently, it is not known (a) whether these same processes are also important for players of other competitive levels and (b) whether specific processes are considered more important within and between competitive levels.

There is substantial inter-trial variability of regulatory conditions in golf when compared to many other sports (Haibach, Reid, & Collier, 2011). For example, a regulation court in the National Basketball Association is always 28.7 m in length and the hoop 3 m off the ground. But with golf, courses are appreciably different in design and present novel conditions based on their geographic setting. In the UK, courses in coastal regions or "Links" courses are common, and include wide, undulating fairways with few trees, but gusting winds and thick areas of rough. "Parkland" courses are more often found in North America and continental Europe, and feature narrow, verdant fairways with fast greens and many wooded areas (Crowell, 2014). In some cases, courses are difficult to categorise into a specific group; rather they incorporate style elements from both Parkland and Links. There are also several, less distinct course types such as "Heathland" – interior courses that feature the undulation and sandy soils of Links, but are usually well-manicured, with tree-lined fairways. Consequently, suitable preparation is important to ensure that shot practice and course strategy is relevant to the specific constraints of the performance environment. Amateur and professional golfers use practice rounds before competition to examine the course layout, plan approach paths and develop course strategies (Aitken & Weigand, 2007; Pilgrim, Robertson, & Kremer, 2016). Many amateur and professional tournaments are played on the same courses each year; therefore, course mapping and anticipatory planning would appear to be just as relevant for less experienced players that are yet to develop their own course strategy or guide books.

Elite amateur and professional players frequently travel from one country to another to participate in competition. During travel, players can experience difficulties in their acute adaptations to new environments. For example, developing countries may provide reduced food and water quality that can expose players to gastrointestinal upset and possible illness (Reilly, Waterhouse, Burke, & Alonso, 2007). The food provided by commercial airlines and sporting venues is also often unsuitable for an athlete's nutritional requirements (Heaney,

O'Connor, Naughton, & Gifford, 2008). Dehydration can affect performance by reducing shot distance, accuracy and distance judgement in hot and humid climates (Smith, Newell, & Baker, 2012). To deal with such challenges, players should approach nutrition proactively by planning and preparing their own food and fluid intake for the tournament (Pilgrim et al., 2018). Specific strategies for nutrition may be particularly relevant for younger players that are less experienced with new food cultures and customs.

International or domestic travel across multiple time zones can result in jet lag (Reilly et al., 2007). Symptoms, such as sleep disruption, decreased mental and physical performance, as well as gastrointestinal disturbances are caused by a mismatch between "body clock time" and new local time (Manfredini, Manfredini, Fersini, & Conconi, 1998; Reilly et al., 2007). Behavioural approaches to reduce the symptoms of jet lag can include the appropriate timing and composition of meals (Manfredini et al., 1998), exposure or avoidance of bright light and the use of caffeine to maintain daytime alertness (Reilly et al., 2007). Most important is to allow sufficient time for an athlete's body clock to adapt to local time in the new environment before competitive play begins (Reilly et al., 2007). However, sufficient time for adaptation may be difficult to organise for some players, such as amateurs, due to their limited finances and dependence on organisational funding. Despite the clear need for effective tournament preparation in golf, there are no theoretical or applied frameworks available to guide practice and education in this area for Golf Australia (GA) and its member associations. Content relating to tournament preparation is included in education programmes by some state and national coaches (Robertson, 2014). However, in the absence of peer-reviewed literature, the origin of the content used by GA is unclear and may not represent agreement between experts. Further, the content to date has not been operationalised into a user-friendly format; that is, a format that is easy to use and/or understand for relevant stakeholders (Stevenson, 2010).Thus,

it is difficult for coaches to oversee and guide the education of players because of the potential lack of consistency and gradual delivery of content throughout a player's development.

To achieve widespread acceptance of any developed framework, broad agreement on critical content is required from key stakeholder groups (Mokkink et al., 2010). Previous research in disciplines such as medicine (Meijer, Ihnenfeldt, Vermeulen, De Haan, & Van Limbeek, 2003), exercise and sport science (Robertson, Kremer, Aisbett, Tran, & Cerin, 2017) and quality of life research (Mokkink et al., 2010) has used the Delphi technique to seek consensus and develop standardised guidelines or protocols for professional practice. The Delphi approach uses a panel of experts, responding to a series of questionnaires with aggregate feedback provided to help facilitate consensus from the panel (Hasson, Keeney, & McKenna, 2000). This approach is useful in areas where there is a lack of empirical evidence and established knowledge (Mokkink et al., 2010). Recent work has successfully used this technique to develop a hierarchy of attributes important for talent identification in youth soccer (Larkin & O'Connor, 2017) and officiating in rugby (Morris & O'Connor, 2017). The primary aim of this study was to achieve expert consensus on the relative importance of golf-specific tournament preparation items for players of different competitive levels. A secondary aim was to develop a framework to score and subsequently rank the importance of these behaviours to players of five competitive levels that can be used to inform and guide coaching practice.

3.3 Methods

3.3.1 Participants

Participants from Australia, England, New Zealand, Canada, Sweden, Scotland and the United States were invited to contribute to an expert panel (countries ordered by number of experts invited). To ensure all relevant stakeholder groups were included, three participant groups were formed: (1) Australian golf coaches and high-performance staff from the

Professional Golf Association (PGA) and GA; (2) Australian elite amateur and professional players; (3) international academics. Inclusion criteria for the coaches was >10 years of coaching experience as well as a current or previous working relationship with elite amateur or professional players. For the high-performance staff, individuals in senior roles were targeted, for example, the GA high-performance director and manager. Players were required to be either: (1) a member of the GA Amateur National Squad, (2) a member of the GA rookie squad (professional golfers) or (3) an Olympic representative. Academics required a back-ground of scientific publications relating to the field of golf or coaching science (≥3 publications) (Robertson et al., 2017). Golf coaches, high-performance staff and players were recruited via liaison with the first author's personal industry contacts. Recruitment for the international academics involved "cold contacting" using publicly available email addresses and contact details provided by the third author. All participants were provided with a document explaining the aims, procedures and requirements of the study. Informed consent was obtained from all participants prior to undertaking the first questionnaire. Ethical approval for the study was provided by the relevant Institutional Human Research Ethics Committee.

3.3.2 Procedure

A list of tournament preparation items was developed by the first author, with revisions made based on feedback provided by a steering committee, comprising all authors. Items were based on the results of previous work, involving interviews with elite-level players and expert coaches (Pilgrim et al., 2018). Once finalised, the initial questionnaire included 48 items that were assigned to one of three categories: (1) the pre-tournament period, (2) the tournament period and (3) the post-tournament period. A web- based commercial survey provider was used to administer the questionnaire (Survey Monkey Inc., USA). Panel members were asked to score the relative importance of each item to players of different competitive levels, with 1

indicating “not at all important” and 5 “extremely important”. Two sets of definitions were provided to ensure that the five competitive levels used were familiar to all participant groups (see Figure 3.1). The first included terminology from the GA talent pathway, based on the Foundation, Talent, Elite and Mastery (FTEM) framework (Gulbin, Croser, Morley, & Weissensteiner, 2013). The FTEM framework is represented by 4 macro and 10 micro phases: Foundation (F1-F3), Talent (T1-T4), Elite (E1-E2) and Mastery (M1) (Gulbin et al., 2013). Given the complexity of some of the items included, the steering committee elected to include competitive levels T3 to M1. The second set of definitions were intended to be more recognisable to the PGA coaches and academics. When completing the questionnaire, participants could provide justification for their responses and comment as to whether they agreed with the description used for each item.

Figure 3.1. The two groups of definitions for the player competitive levels provided to participants as part of the first Delphi round.

3.3.2.1 Round one

The first round of the Delphi remained open for seven weeks (September to November 2016). Following this period, participants' responses were exported to Microsoft Excel for statistical analysis. Within the Delphi literature, cut-off values between 55% and 100% have been used to represent consensus (Powell, 2003). Studies of similar designs have used the consensus criteria of 67% agreement in the top two scores on a five-point scale (Hasson et al., 2000; Robertson et al., 2017). Given that the purpose of this study was to determine a score and ranking for each item, for an item to achieve consensus 67% agreement was required in two adjacent scale categories (e.g. 4 and 5, 1 and 2, etc.). If less than 67% agreement was reached on an item or if consensus was reached across some, but not at all levels, it was

included in the next round (Mokkink et al., 2010). Items that were adjusted or changed based on participant feedback were also included in the next round.

3.3.2.2 Round two

Prior to round two, participants were provided with a report explaining the results of round one. This included: (1) a series of graphs showing the participant's score for each item versus the median score of the panel and (2) a document indicating the specific revisions to each item. Participants were asked to consider the response from the panel, and the results of the preceding round when scoring items in round two.

3.4 Results

3.4.1 Participants

Table 3.1 describes the details of the participants in both rounds of the Delphi. A total of 158 experts were invited to participate in the first and second rounds (30 academics, 12 players, 111 coaches and 5 high-performance staff). Of these, 122/158 (77%) did not respond; 36/158 (23%) participated in the first round; and 21/36 (58%) participated in the second round. The panel members predominately came from Australia (n = 30), while four were from England, one from New Zealand and one from Canada.

Table 3.1. Delphi participants' characteristics and responses by group.

				Round One		Round Two	
Participant group	Participants invited (n)	Golf experience (mean, standard deviation)	Participant age (mean, standard deviation)	Number (n)	Response rate (%)	Number (n)	Response rate (%)
Coaches	111	31.95 (±12.09)	49.21 (±9.50)	19	17	11	58
High-performance staff	5	20.8 (±5.97)	41.2 (±3.35)	5	100	3	60
Players	12	11.83 (±4.17)	19.83 (±2.93)	6	50	2	33
Academics	30	16 (±5.06)	41.50 (±8.17)	6	20	5	83
Total	158	24.39 (±12.55)	41.92 (±13.08)	36	28	21	58

3.4.2 Analysis

3.4.2.1 Round one

A summary of the results of round one and two is shown in Figure 3.2 and Table 3.2. Of the 48 items included in the first round, 28/48 (58%) items achieved consensus with respect to importance to players of different competitive levels. The average consensus for items across

each of the competitive levels, being EJA ESA, ATP, ITP, and MC for round one was 73%, 74%, 74%, 73%, and 73% respectively. The items with the lowest agreement in consensus across competitive levels (i.e., >15% difference) for round one were item 10 (Structuring technical/shot practice relevant to the playing conditions of the tournament course – 23% difference), item 11 (Contacting the tournament office before arrival to book a time for practice rounds – 31% difference), item 38 (Developing a financial plan or budget for the tournament – 33% difference), item 39 (Arrive at the venue at least 3-4 days prior to the first round of competition for long-haul travel – 16% difference), item 46 (Setting outcome or scoring goals for the tournament – 19% difference), and item 47 (Contacting a sports psychologist or practitioner for a post-round debrief – 16% difference). Nineteen changes were proposed by the first author and confirmed by the steering committee based on the feedback provided by the panel. Most of these related to changes in the terminology used. For example, the item "structuring pre-round technical practice to match the requirements of the course and hitting a variety of distances (partial and full), clubs, and shot types" was changed to include the term "shot practice". In some cases, more detailed changes were required, and several lines of text were added. For example, seven participants suggested the item "performing an evaluation or debrief with the coach after each round" needed more information to clarify the focus of the player-coach evaluation. Consequently, this item was altered to include "the debrief should focus on the positive aspects of the player's game, and on-course decision-making, while avoiding technical evaluation and over-analysis".

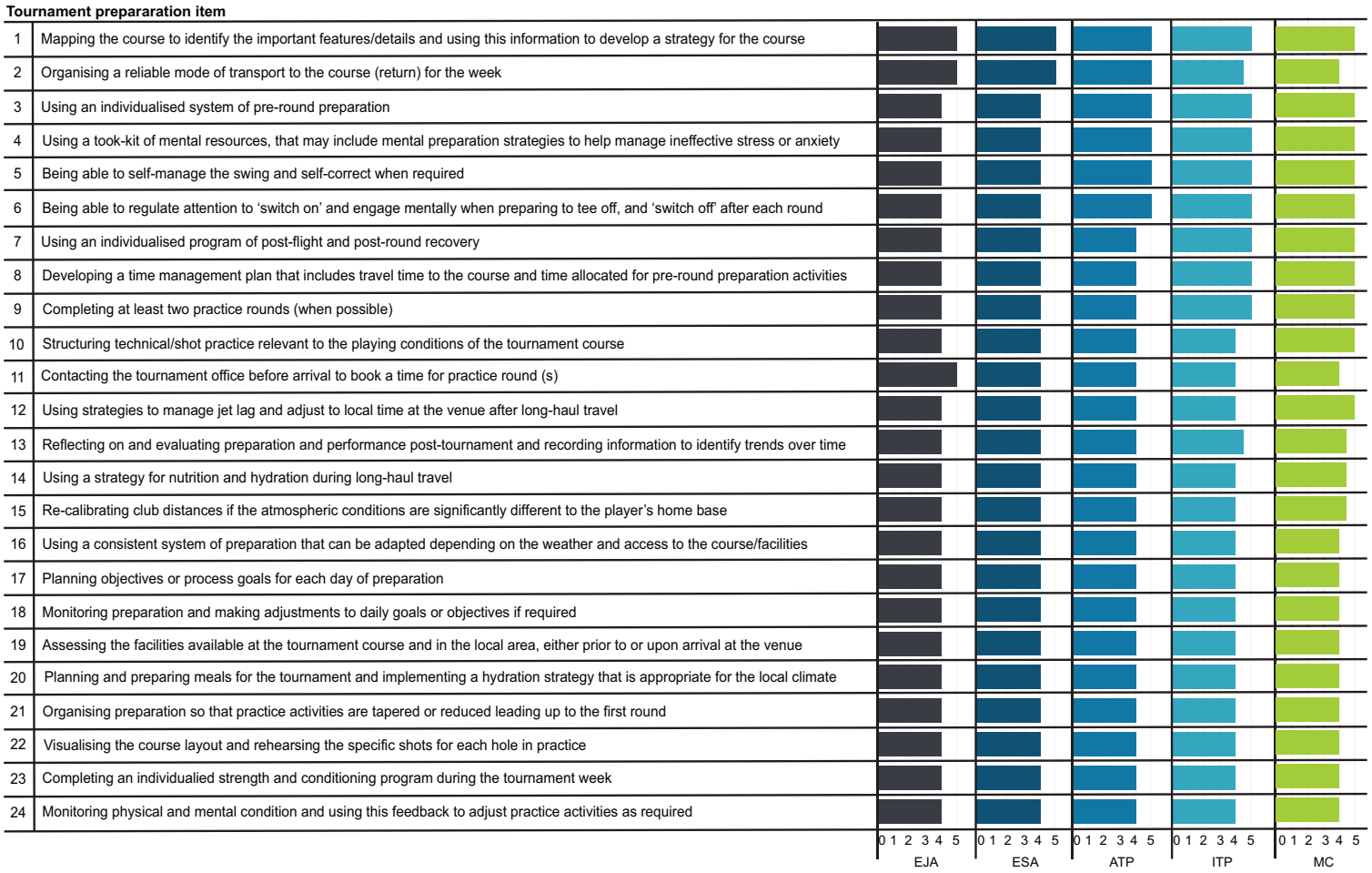


*Figure 3.2. Median scores for each of the tournament preparation items. Item descriptions provided are abbreviated. Items organised by highest mean score across all competitive levels. Score provided is the score for the last round the item was included. ***indicates items that did not reach consensus. Note: EJA (Elite junior amateur), ESA (Elite senior amateur), ATP (Australian touring professional), ITP (International touring professional), MC (Major champion).*

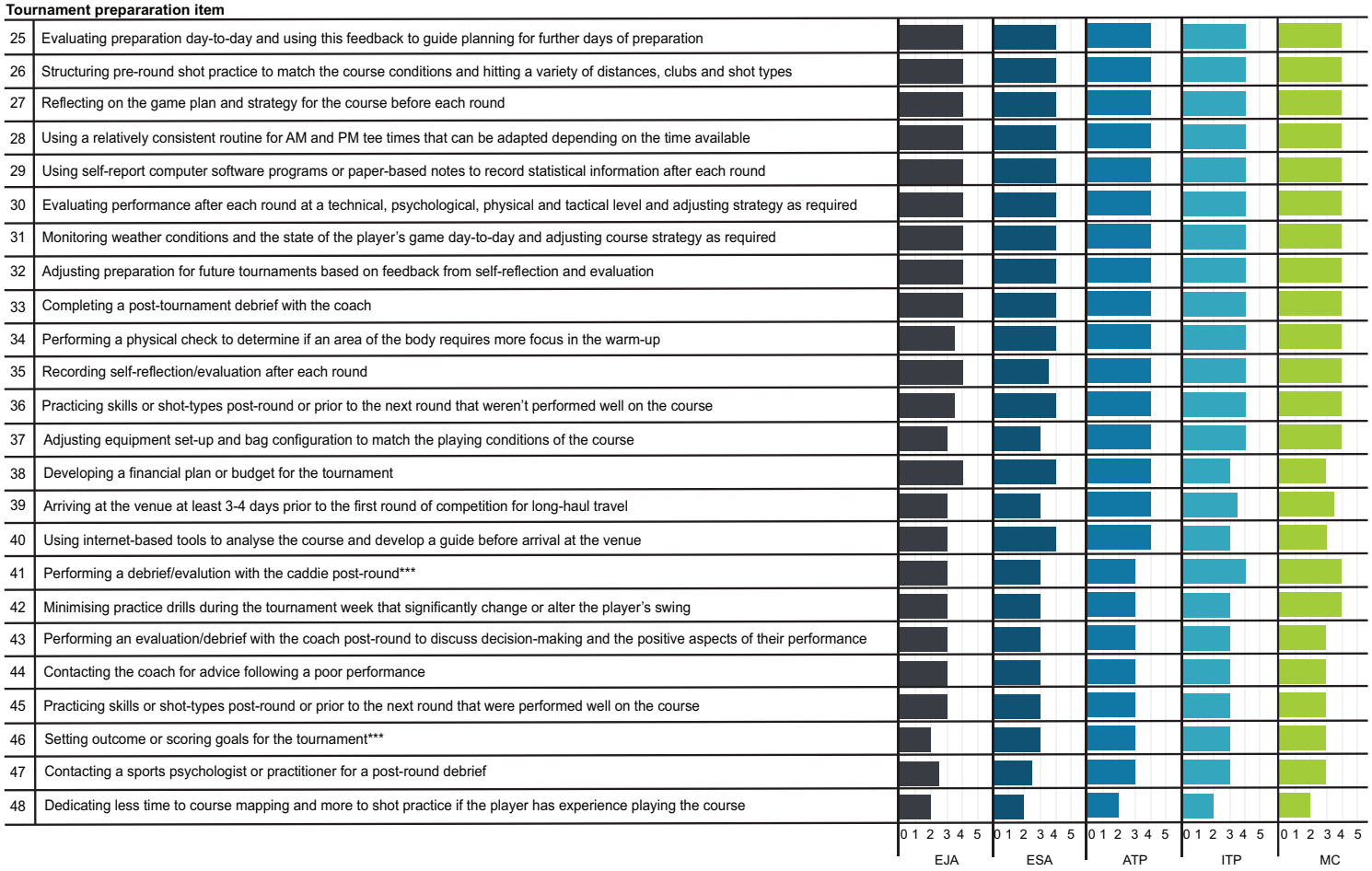


Figure 3.2. Continued.

Table 3.2. Percentage of agreement for items for each Delphi round.

	Round One					Round Two				
Item	EJA (%)	ESA (%)	ATP (%)	ITP (%)	MC (%)	EJA (%)	ESA (%)	ATP (%)	ITP (%)	MC (%)
1	94	91	89	89	89					
2	91	89	83	76	77	90	85	86	71	71
3	83	79	82	82	82					
4	91	94	91	94	89					
5	85	88	88	91	91					
6	82	88	88	88	83					
7	71	77	80	86	86					
8	94	94	94	94	94					
9	71	74	80	77	75	67	71	71	71	76
10	71	74	88	94	92					
11	94	91	74	63	64				67	70
12	74	74	77	80	81					
13	85	85	88	88	91					
14	77	80	80	83	83					
15	74	71	83	86	86	76	81	81	90	95
16	83	86	86	89	89					
17	69	63	71	71	69	76	71	67	67	67
18	77	80	77	77	75					
19	74	74	77	71	67					
20	69	68	74	77	78					
21	66	66	63	69	64	67	67	67	71	71
22	74	76	71	71	66	90	90	90	90	90
23	66	71	66	69	69	71	71	67	67	67
24	94	97	91	89	89					
25	77	80	74	71	72					
26	76	85	82	82	83					
27	68	68	68	74	71					
28	65	68	65	65	65	76	81	90	90	90
29	71	59	68	62	60	67	71	76	71	71
30	68	74	76	76	77					
31	71	74	76	76	77					
32	94	91	94	94	94					
33	79	74	76	82	82					
34	56	56	53	53	54	81	76	71	67	67
35	71	76	79	74	69					
36	68	71	65	67	63	86	81	71	81	67
37	63	63	57	66	64	67	76	76	86	90
38	69	69	77	49	44				67	70
39	60	55	53	49	44	76	76	67	67	67
40	46	46	54	53	50	71	71	76	67	71
41	53	59	59	59	60	57	48	58	62	57

42	57	60	66	66	61	71	76	71	71	71
43	67	70	64	67	67	76	71	76	71	71
44	76	74	79	71	71					
45	59	56	56	56	57	71	67	67	67	67
46	57	63	49	46	44	57	57	48	48	52
47	68	65	59	53	51		81	71	67	67
48	63	60	54	57	58	81	76	76	67	67

Note: EJA (Elite junior amateur), ESA (Elite senior amateur), ATP (Australian touring professional), ITP (International touring professional), MC (Major champion).

3.4.2.2 Round two

Of the 23 items included in the second round, 20 items (87%) achieved consensus. The average consensus for items across each of the competitive levels, being EJA ESA, ATP, ITP, and MC for round two was 74%, 74%, 73%, 71%, 72% respectively. The items with the lowest agreement in consensus across competitive levels (i.e., >15% difference) for round one were item 2 (Organising a reliable mode of transport to the course (return) for the week – 19% difference), item 15 (Re-calibrating club distances if the atmospheric conditions are significantly different than the player's home base – 19% difference), item 36 (Practicing skills or shot-types post-round or prior to the next round that weren't performed well on the course – 19% difference), and item 37 (Adjusting equipment set-up and bag configuration to match the playing conditions of the course – 23% difference). Across both rounds, 46 of the 48 items achieved consensus from the expert panel. The two items not included in the final framework were "setting outcome or scoring goals for the tournament" and "performing a debrief/evaluation with the caddie post-round".

3.4.3 Framework Development

A framework developed from the findings of the Delphi has been included as Appendix 1. This framework is composed of a ranked list of items that display perceived importance relative to different competitive levels.

3.5 Discussion

In the present study, a two-round Delphi was used to achieve consensus on the importance of specific tournament preparation items to players of different competitive levels in golf. Consensus was achieved for 46 of the 48 items included in the questionnaire. These findings were used to develop a ranked framework of items for tournament preparation. Results from the Delphi showed that overall a greater number of items were considered "extremely important" for more elite players (i.e., MC = 10, ITP = 8, ATP = 6, ESA = 2, EJA = 3), when compared with those of a lower competitive level, providing evidence of a trend whereby level of item importance increased monotonically with competitive level. This indicates that more comprehensive systems of preparation are required as players progress along the talent pathway. This was expected given that minor changes in strategy or technique can have a profound influence on performance at the elite level. The present findings are consistent with the previous work that has described the use of more detailed preparation routines for professional tour players when compared with teaching professionals (McCaffrey & Orlick, 1989). It was also notable that 23 of the 48 items received the same score across all competitive levels, suggesting that many of the items in the framework were deemed important regardless of competitive level. However, as recognised by several participants, lower level or poorer performing players are unlikely to have access to the financial resources to complete some of these items; therefore, these are likely aspirational in nature.

The item considered most important in preparation was "mapping the course to identify the important features and details including the speed and slope of the greens, location of hazards, types of grasses, key yardages, approach paths to the green, prevailing wind, essential shot types and skills, and using this information to develop a strategy or game plan for shot making." Previous research has recognised the critical role of information-gathering activities performed prior to competition. For example, Eccles, Ward, and Woodman (2009) observed how expert orienteers study existing maps of terrain to gather information about the constraints of an upcoming competition. Furthermore, orienteers use this information to design practice tasks and activities to represent these constraints (Eccles et al., 2009). In order to have a meaningful contribution on performance, practice must simulate the ecological constraints of a specific performance environment (Araújo, Davids, Bennett, Button, & Chapman, 2004; Davids, Araújo, Seifert, & Orth, 2015). Therefore, while course mapping can assist players to identify the constraints present at a tournament course, it could also function as a prerequisite for the implementation of other tournament preparation items. That is, knowledge of competition constraints allows players to complete items relating to practice design, such as "structuring technical or shot practice to the playing conditions of the tournament course". It should be noted that the importance of information-gathering activities and other pre-tournament items is also related to the amount of time between tournaments. Smaller periods of time – common for professional and elite players – provide less time for players to engage in information-gathering activities and less opportunity to benefit from structured representative practice. However, as more time becomes available, so does the opportunity to engage in pre- tournament behaviours (Eccles et al., 2009).

The second highest scoring item in the framework was "organising a mode of transport from the airport to accommodation, and from accommodation (return) for the week". Several other items associated with planning and time management also received high scores from the

panel. While these items appear to have a less direct influence on performance, it is likely that they were viewed as foundational and necessary for the implementation of other items. For example, the failure to organise a dependable method of transport and allow sufficient travel time to the course could disrupt preparation by providing reduced time for pre-round activities (e.g. physical or mental preparation). Previous studies have identified aspects of planning and time management as critical factors for success in golf (McCaffrey & Orlick, 1989) and Olympic sports (Orlick & Partington, 1988).

The third and fourth items perceived as most important by participants were related to physical and mental preparation. Physical preparation was concerned with players "implementing an individualised system of pre-round preparation that can be adapted depending on the availability of practice facilities, arrival time to the course, the weather or climatic conditions, and may include (1) pre-round physical warm-up (e.g. dynamic stretching, self- massage, mobility work) and (2) pre-round technical routine (e.g. putting, chipping, range work)." Warm-up activities are typically used by competitive athletes to enhance physical performance and prevent sports-related injuries (Shellock & Prentice, 1985). Studies in golf have provided support for this notion by reporting significant increases in club head speed (Fradkin, Sherman, & Finch, 2004) and decreases in injury occurrence (Fradkin, Cameron, & Gabbe, 2007) when players participated in a pre-round warm-up. Significant decreases in club head speed, ball displacement and accuracy have been observed when players followed a passive stretching routine, indicating this type of exercise should be avoided in preference to the dynamic and golf-specific movements described in the present study (Gergley, 2009).

Mental preparation was associated with players "developing a 'Tool kit' of mental resources and strategies (helpful cognitions and appropriate cues) to help manage ineffective stress and anxiety before a round". Psychological factors have consistently been shown to be

important for the outcome of golf competition (Hellström, 2009b). For example, research examining the influence of mental strategy use before a round indicates positive associations between pre-competition imagery and golf performance (Beauchamp, Bray, & Albinson, 2002). Mental preparation strategies have also been found to be positively associated with performance in triathlon (Houston, Dolan, & Martin, 2011) and Olympic wrestling (Gould, Eklund, & Jackson, 1992). The development of a framework of tournament preparation items represents the main practical application of this work. The framework consists of 46 items from the Delphi questionnaire and provides consensus-based guidelines for effective practice in tournament preparation. The developed framework could be used by national sport organisations to guide the development of more comprehensive learning environments for players and trainee coaches. Further, it presents easily applicable content for players to help structure their own preparation routines. Based on the participation of many experts and industry professionals, the framework is well- placed for uptake by relevant stakeholders in the sport. While the framework does appear to provide guidelines for priority-based coaching, it is not intended to be used as a prescriptive or rigid coaching tool. The authors acknowledge that players have different individual preferences and requirements for preparation. Therefore, the framework could be used as a reference for coaches and players to select items and develop routines based on the individual needs of the athlete.

Several limitations may have influenced the findings of this study. First, while international experts were invited to participate, the final panel included mostly participants from Australia; therefore, their opinions, as well as the current findings are specific to this geographic region. As a result, studies performed in other countries may support or challenge the observed results. Another limitation is that, while this study provides guidelines on the perceived importance of preparation items, it does not establish at a behavioural level how these activities relate to performance. For example, it is not known as to whether completing a

greater number of items or specific items from the framework translates to concomitant performance benefits. Lastly, the response rates for both Delphi rounds could be considered low and may suggest issues with participation or non-response bias; yet, such response rates (RR) are not unprecedented and are generally acceptable in Delphi research. For example, recent studies have reported RR of 21% (Robertson et al., 2017), 31% (Kleynen et al., 2014), and 52% (Gillis et al., 2013) – RR that are not considerably different than those recorded in our study. Additionally, participant bias was tested for using Chi-square (categorical measures) and t-test (continuous measures) analyses, with results indicating no significant differences ($p < 0.01$) between respondents and non-respondents.

Future studies may wish to consider a cross-cultural or region-specific analysis when undertaking research in this area. In addition, because this was the first study to categorise and score preparatory behaviours in the literature, it could provide procedural guidelines for building curriculums in other sports. It could also be beneficial to compare the applied use of items in the framework with performance data to validate and assess the relationship between specific items and scoring success. Given that this framework and the way it has been derived is novel to the sport, qualitative research may also be valuable to assess the uptake and user acceptability of the framework for coaches and players. For example, the framework could be distributed to a representative group of players/coaches and following a period of familiarisation, qualitative interviews could then be performed to examine the participants' perceptions of the framework.

3.6 Conclusion

This study aimed to achieve expert consensus on the importance of specific tournament preparation items to players of different competitive levels. Within a two-round Delphi process, consensus was reached for 46 of the 48 items included in the questionnaire. These items were

used to develop a ranked framework of items for each competitive level. The findings provide initial evidence of the items or behaviours that content experts consider important for players when preparing for tournaments in golf. These findings have the potential to assist in the development of education programmes and curriculum by national sport organisations for players and trainee coaches. Such programmes could give increased focus to items with the highest score; conversely, less emphasis could be applied to items that scored poorly and were considered of limited significance. For coaches and practitioners, the findings could be used to inform a screening process to identify the strengths and deficiencies of player's preparation routines and structure their individualised training programmes. In addition, the framework could be made available to individual players via a mobile application or web-based learning module, thereby encouraging players to become proactive participants in their own preparation and development (Mallet, 2005). Comparing the applied use and practice of items in the framework with performance data to determine the relationship between specific items and tournament success represents an obvious direction for future studies in this area.

REFERENCES

Aitken, V., & Weigand, D. (2007). *Caddy-talk: Psychology of being a great golf caddy.* Milton Keynes: Dawvija Publishing.

Araújo, D., Davids, K., Bennett, S. J., Button, C., & Chapman, G. (2004). Emergence of sport skills under constraints. In M. Williams, & N. Hodges (Eds.), *Skill acquisition in sport: Research, theory and practice* (pp. 409–433). New York, NY: Routledge.

Beauchamp, M. R., Bray, S. R., & Albinson, J. G. (2002). Pre-competition imagery, self-efficacy and performance in collegiate golfers. *Journal of Sports Sciences, 20,* 697–705.

Bois, J. E., Sarrazin, P. G., Southon, J., & Boiché, J. C. (2009). Psychological characteristics and their relation to performance in professional golfers. *The Sport Psychologist, 23,* 252– 270.

Cotterill, S. T., Sanders, R., & Collins, D. (2010). Developing effective pre-performance routines in golf: Why don't we ask the golfer? *Journal of Applied Sport Psychology, 22,* 51–64.

Crowell, B. (2014). *Golf.* New York, NY: Penguin Group Inc.

Davids, K., Araújo, D., Seifert, L., & Orth, D. (2015). An ecological dynamics perspective. In J. Baker, & D. Farrow (Eds.), *Routledge handbook of sport expertise* (pp. 130–135). New York, NY: Routledge.

Douglas, K., & Fox, K. R. (2002). Competition in women professional golfers. In E. Thain (Ed.), *Science and golf IV: Proceedings of the world scientific congress of golf* (pp. 157–267). New York, NY: Routledge.

Eccles, D. W., Ward, P., & Woodman, T. (2009). Competition-specific preparation and expert performance. *Psychology of Sport and Exercise, 10*, 96–107.

Fradkin, A. J., Cameron, P. A., & Gabbe, B. J. (2007). Is there an association between self-reported warm-up behaviour and golf related injury in female golfers? *Journal of Science and Medicine in Sport, 10,* 66–71.

Fradkin, A. J., Sherman, C. A., & Finch, C. F. (2004). Improving golf performance with a warm up conditioning programme. *British Journal of Sports Medicine, 38,* 762–765.

Gergley, J. C. (2009). Acute effects of passive static stretching during warm-up on driver clubhead speed, distance, accuracy, and consistent ball contact in young male competitive golfers. *The Journal of Strength and Conditioning Research, 23,* 863–867.

Gillis, L., Tomkinson, G., Olds, T., Moreira, C., Christie, C., Nigg, C., ... & Dorovolomo, J. (2013). Research priorities for child and adolescent physical activity and sedentary behaviours: An international perspective using a twin-panel Delphi procedure. *International Journal of Behavioural Nutrition and Physical Activity*, *10*.

Gould, D., Eklund, R. C., & Jackson, S. A. (1992). 1988 US Olympic wrestling excellence: I. Mental preparation, precompetitive cognition, and affect. *The Sport Psychologist, 6,* 358–382.

Gulbin, J. P., Croser, M. J., Morley, E. J., & Weissensteiner, J. (2013). An integrated framework for the optimisation of sport and athlete development: A practitioner approach. *Journal of Sports Sciences, 31,* 1319–1331.

Haibach, P., Reid, G., & Collier, D. (2011). *Motor learning and development*. Champaign, IL: Human Kinetics.

Hasson, F., Keeney, S., & McKenna, H. (2000). Research guidelines for the Delphi survey technique. *Journal of Advanced Nursing, 32,* 1008–1015.

Hayman, R., Polman, R., Taylor, J., Hemmings, B., & Borkoles, E. (2011). Development of elite adolescent golfers. *Talent Development & Excellence, 3,* 249–261.

Heaney, S., O'Connor, H., Naughton, G., & Gifford, J. (2008). Towards an understanding of the barriers to good nutrition for elite athletes. *International Journal of Sports Science and Coaching, 3,* 391–401.

Hellström, J. (2009a). Competitive elite golf. *Sports Medicine, 39,* 723–741.

Hellström, J. (2009b). Psychological hallmarks of skilled golfers. *Sports Medicine, 39,* 845–855.

Hill, D. M., Hanton, S., Matthews, N., & Fleming, S. (2011). Alleviation of choking under pressure in elite golf: An action research study. *The Sport Psychologist, 25,* 465–488.

Houston, M., Dolan, S., & Martin, S. (2011). The impact of physical, nutritional, and mental preparation on triathlon performance. *The Journal of Sports Medicine and Physical Fitness, 51,* 583–594.

Hume, P. A., Keogh, J., & Reid, D. (2005). The role of biomechanics in maximising distance and accuracy of golf shots. *Sports Medicine, 35,* 429–449.

Kleynen, M., Braun, S. M., Bleijlevens, M. H., Lexis, M. A., Rasquin, S. M., Halfens, J., ... & Masters, R. S. (2014). Using a Delphi technique to seek consensus regarding definitions, descriptions and classification of terms related to implicit and explicit forms of motor learning. *PLoS One*, *9*, e100227.

Larkin, P., & O'Connor, D. (2017). Talent identification and recruitment in youth soccer: Recruiter's perceptions of the key attributes for player recruitment. *PLoS ONE, 12,* e0175716.

Mallet, C. J. (2005). Self-determination theory: A case study of evidence-based coaching. *The Sport Psychologist, 19,* 417–429.

Manfredini, R., Manfredini, F., Fersini, C., & Conconi, F. (1998). Circadian rhythms, athletic performance, and jet lag. *British Journal of Sports Medicine, 32,* 101–106.

McCaffrey, N., & Orlick, T. (1989). Mental factors related to excellence among top professional golfers. *International Journal of Sport Psychology, 20,* 256–278.

Meijer, R., Ihnenfeldt, D., Vermeulen, M., De Haan, R., & Van Limbeek, J. (2003). The use of a modified Delphi procedure for the determination of 26 prognostic factors in the sub-acute stage of stroke. *International Journal of Rehabilitation Research, 26,* 265–270.

Mokkink, L. B., Terwee, C. B., Patrick, D. L., Alonso, J., Stratford, P. W., Knol, D. L., ... de Vet, H. C. (2010). The COSMIN checklist for assessing the methodological quality

of studies on measurement properties of health status measurement instruments: An international Delphi study. *Quality of Life Research, 19,* 539–549.

Morris, G., & O'Connor, D. (2017). Key attributes of expert NRL referees. *Journal of Sports Sciences, 35,* 852–857.

Orlick, T., & Partington, J. (1988). Mental links to excellence. *The Sport Psychologist, 2,* 105–130.

Pilgrim, J., Kremer, P., & Robertson, S. (2018). The self-regulatory and task-specific strategies of elite-level amateur golfers in tournament preparation. *The Sport Psychologist, 32,* 169-177.

Pilgrim, J., Robertson, S., & Kremer, P. (2016). A qualitative investigation into the role of the caddie in elite-level golf. *International Journal of Sports Science and Coaching, 11,* 599–609.

Powell, C. (2003). The Delphi technique: Myths and realities. *Journal of Advanced Nursing, 41,* 376–382.

Reilly, T., Atkinson, G., Edwards, B., Waterhouse, J., Åkerstedt, T., Davenne, D., ... Wirz-Justice, A. (2007). Coping with jet-lag: A position statement for the European college of sport science. *European Journal of Sport Science, 7,* 1–7.

Reilly, T., Waterhouse, J., Burke, L. M., & Alonso, J. M. (2007). Nutrition for travel. *Journal of Sports Sciences, 25*, 125-134.

Golf Australia. (2014). *National athlete pathway framework*.

Robertson, S., Kremer, P., Aisbett, B., Tran, J., & Cerin, E. (2017). Consensus on measurement properties and feasibility of performance tests for the exercise and sport sciences: A Delphi study. *Sports Medicine Open, 3,* 1-10.

Shellock, F. G., & Prentice, W. E. (1985). Warming-up and stretching for improved physical performance and prevention of sports-related injuries. *Sports Medicine, 2,* 267–278.

Smith, M. F. (2010). The role of physiology in the development of golf performance. *Sports Medicine, 40,* 635–655.

Smith, M. F., Newell, A. J., & Baker, M. R. (2012). Effect of acute mild dehydration on cognitive-motor performance in golf. *The Journal of Strength & Conditioning Research, 26,* 3075–3080.

Stevenson, A. (Ed.). (2010). Oxford dictionary of English. Oxford: Oxford University Press.

4 CHAPTER FOUR – STUDY III

The validity of a self-report version of the tournament preparation framework (TPF-SR) for competitive golf.

Pilgrim, J., Kremer, P., & Robertson, S. (2018). The validity of a self-report version of the tournament preparation framework (TPF-SR) for competitive golf. *International Journal of Performance Analysis in Sport.* Accepted for review.

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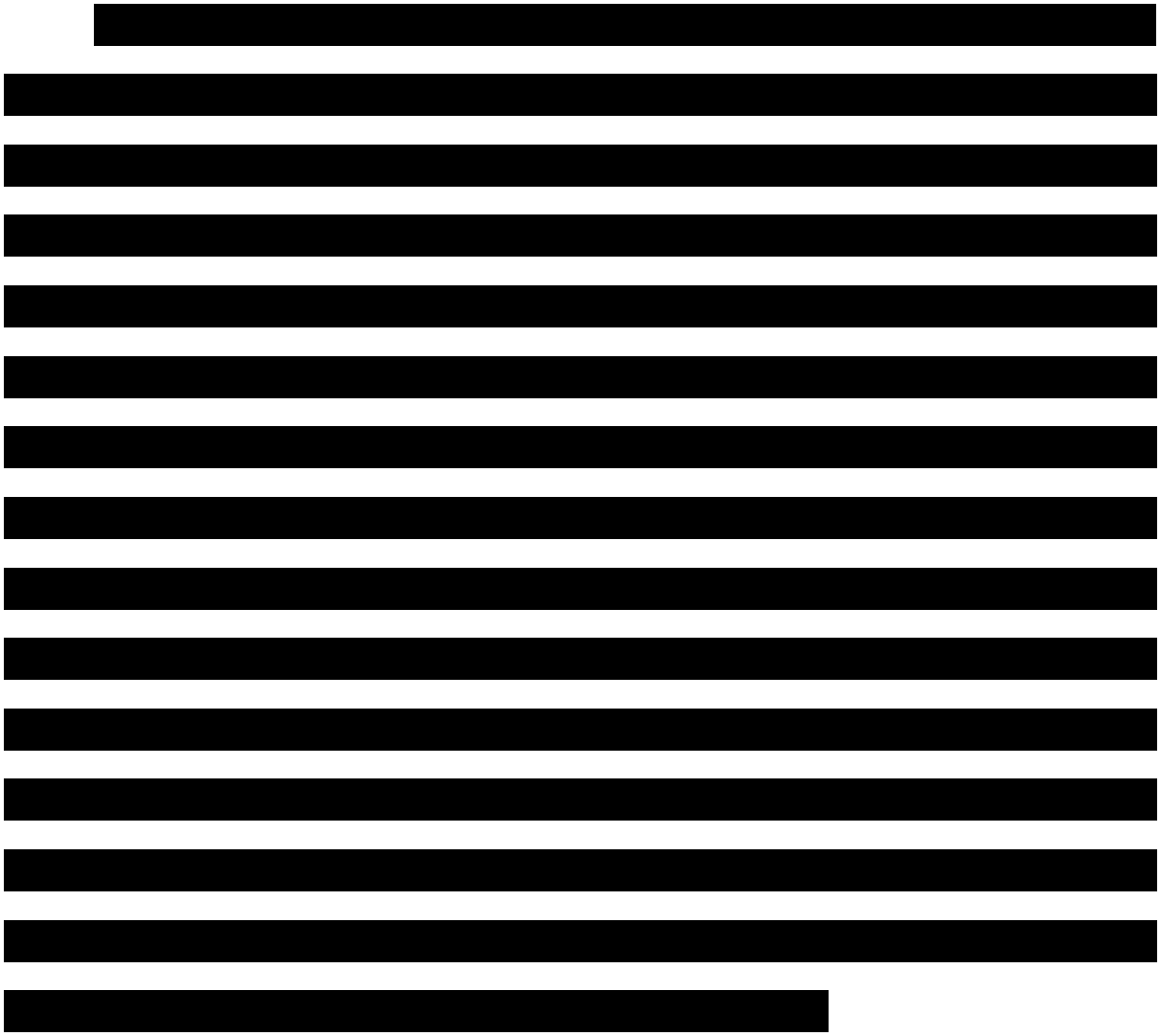

5 CHAPTER FIVE – STUDY IV

The discriminant validity of the tournament preparation framework self-report (TPF-SR) instrument in amateur golfers.

Pilgrim, J., Kremer, P., & Robertson, S. (2018). The discriminant validity of the tournament preparation framework self-report (TPF-SR) instrument in amateur golfers. *Research Quarterly for Exercise and Sport.* Accepted for review.

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6 CHAPTER SIX - DISCUSSION

6.1 Overview of Discussion

A discussion of the findings of this doctoral thesis is provided in the following five sections. The first section "Thesis aims and summary of findings" re-states the aims of the thesis and provides a summary of the aims, methods, and findings of each of the four studies (i.e., Study I to Study IV) that comprise the thesis chapters. In the second section "Theoretical implications" the findings are discussed in reference to relevant research and theoretical/conceptual frameworks. The third section "Practical implications" considers the practical implications of the key findings for relevant stakeholders including golfers, coaches, practitioners, and administrators. The fourth section "Strengths and limitations" outlines the strengths and limitations of the methodology and research techniques used throughout this thesis. In section five "Future research directions" recommendations are provided to guide future research in this area.

6.2 Thesis Aims and Summary of Findings

6.2.1 Thesis Aims

This thesis had two primary aims. The first aim was to determine the self-regulatory and task-specific behaviours important for tournament preparation in golf. Study I and II identified and described these behaviours and developed a framework (i.e., TPF) to demonstrate their relative importance to golfers of different participation levels. The second aim was to develop a self-report version of the TPF to assess different aspects of golfers' tournament preparation. Study III and IV developed the TPF-SR and evaluated its measurement properties using a combination of self-report administration, interviews, and direct observation. The specific aims and results of these studies are summarised and discussed in the section below.

6.2.2 Summary of Findings

6.2.2.1 Study I: The self-regulatory and task-specific strategies of elite amateur golfers in tournament preparation.

The aim of this study was to identify the self-regulatory and task-specific strategies used by elite amateur golfers before and during a tournament. A second aim was to determine how golfers integrate these strategies to develop preparatory routines. Before undertaking this study, it was recognised that golf coaches at an amateur level tend to focus mostly on the technical analysis and refinement of golfers' swing patterns and the development of physical abilities. Whereas less attention is given to other components of performance, such as tournament preparation, that could also be important for scoring success. Increased knowledge of the tournament preparation strategies performed by elite amateur golfers and endorsed by expert coaches/practitioners was proposed to have implications for education practices. Elite amateur golfers and expert coaches/practitioners took part in qualitative interviews. Results indicated that the behaviours considered important in preparation included strategies to: structure and implement preparation; develop strategy for the course; optimise playing conditions; and, facilitate effective self-regulation. Coaches indicated that the selection of strategies for tournament preparation should be based on golfers' individual needs and requirements, rather than a generic "one size fits all" approach. Golfers, coaches, and practitioners also reported that the planning of strategies should be specific to the constraints of the tournament course and monitored/adjusted based on the golfers' situational appraisals.

6.2.2.2 Study II: The development of a tournament preparation framework for competitive golf: A Delphi study.

Study I found that tournament preparation is important for golfers to increase course knowledge, develop course strategy, optimise playing conditions, and facilitate effective self-

regulation. Yet, it was not known whether specific tournament preparation behaviours should be prioritised in education and training at different levels of participation. The primary aim of this study was to achieve expert consensus on the importance of tournament preparation items or behaviours. A secondary aim was to develop a framework to rank the relative importance of these behaviours to golfers of five participation levels. An expert panel of 36 coaches, high-performance staff, golfers, and academics participated in a two-round Delphi study. Consensus was reached for 46 of the 48 items and these were used to develop the TPF. The framework comprised both task-specific and self-regulatory items. Self-regulatory items included goal-setting and planning, gathering task-relevant information, seeking social assistance, and self-reflection. For the task-specific items, behaviours included completing practice rounds, self-correcting the swing, and implementing physical/mental preparation routines.

6.2.2.3 Study III: The validity of a self-report version of the tournament preparation framework (TPF-SR) for competitive golf.

This study described the development and preliminary validation of a self-report version of the TPF, known as the TPF-SR. Such an instrument was designed to allow golfers to capture data relating to their preparatory behaviours and cognitions and offer the potential to integrate this with other performance data. Amateur golfers were observed in-situ and interviewed before/during a tournament to determine their endorsement of items from the TPF-SR. Golfers also self-administered the TPF-SR for an international tournament. Validity of the TPF-SR was assessed by comparing the endorsement rates for items from multimethod observations/interviews with golfers' self-report administration. Comparison of mean endorsement rates for both measures showed good agreement. The total proportion of players that endorsed items from the TPF-SR for a tournament was also high.

6.2.2.4 Study IV: The discriminant validity of the tournament preparation framework self-report (TPF-SR) instrument in amateur golfers.

Despite initial evidence of the validity of the TPF-SR, the instrument's ability to discriminate between golfers of different performance levels was not known. Thus, the aim of this study was to determine whether golfers' endorsement (i.e., completion) of items from the TPF-SR could discriminate between those of different rankings. Amateur golfers were observed in-situ and interviewed before/during a tournament to determine their endorsement of items from the TPF-SR. Linear regression and decision-table analyses were used to assess the discriminative properties of the TPF-SR. The linear regression explained golfers' ranking based on their endorsement of ten items with a MAE of 182 ranking positions. The decision-table analysis demonstrated greater accuracy and parsimony, explaining golfers' ranking based on their endorsement of four items with a MAE of 111 ranking positions. Self-regulatory items relating to planning, self-monitoring, reflection/appraisal, and task-specific strategies such as completing practice rounds were most influential in explaining ranking. Together with the findings of Study III, these findings provide support for the validity of the TPF-SR as a tool for golfers to record their tournament preparation behaviours in competition.

6.3 Theoretical Implications of the Research

This doctoral thesis sought to develop a better understanding of the factors that contribute to the demonstration of expert golf performance. In particular, a relatively unexplored area of the golf science literature known as "tournament preparation" was studied to determine the behaviours important for golfers both preceding tournaments, and before/after each round. The temporal dimensions of multi-round golf tournaments are well-suited to a cyclical process of planning, monitoring, and reflecting; thus, it was theorised that specific self-regulatory processes may be important for golfers to direct and regulate their preparatory

behaviours (Cleary, Callan, & Zimmerman, 2012). Self-regulation is a conceptual framework used to understand the cognitive, behavioural, and motivational aspects of learning and performance (Zimmerman, 2000). Despite having its origins in educational psychology, self-regulation has been studied across many disciplines (Panadero, 2017) including sport (e.g., Cleary & Zimmerman, 2001; Kitsantas & Zimmerman, 2002). Most of the research that has examined self-regulation in sport has either compared differences in the self-regulation of experts, non-experts, and novices in task practice (e.g., Cleary & Zimmerman, 2001; Kitsantas & Zimmerman, 2002) or, administered instruments to score athletes' self-regulation and examine differences between elites and non-elites (e.g., Jonker, Elferink-Gemser, & Visscher, 2010; Toering, Elferink-Gemser, Jordet, & Visscher 2009). Results from these studies found that experts use self-regulatory skills more often than non-experts and novices (Cleary & Zimmerman, 2001; Kitsantas & Zimmerman, 2002; Anshel, 1995; Anshel & Porter, 1996), and that athletes' scores on dimensions of self-regulation (e.g., reflection) were positively related to participation level (Jonker et al., 2010; Toering et al., 2009). Collectively, this research has demonstrated support for the role of self-regulation in sport performance, yet few studies had examined self-regulation in the context of golf or competition preparation. Thus, the first aim of this thesis was to determine whether self-regulation is important for golf tournament preparation, and if so, to identify the key self-regulatory processes or behaviours that facilitate effective preparation.

From qualitative interviews with golfers, coaches, and practitioners it was found that self-regulatory processes such as planning, goal-setting, self-monitoring, and reflection were considered important for tournament preparation. Golfers' self-report administration of the TPF-SR instrument during a tournament also demonstrated high completion/endorsement rates for these processes. For example, greater than 90% of the golfers studied reported that they undertook behaviours to reflect on and evaluate their performance and preparation after a

tournament. Additionally, in the Delphi questionnaire behaviours and processes relating to planning, goal-setting, self-monitoring, and reflection received high scores; indicating high levels of perceived importance from the panel. Linear and non-linear analyses found that golfers' endorsement/completion of behaviours relating to planning, self-monitoring, and reflection/appraisal were able to discriminate between those of different rankings. These findings were consistent with previous research that found specific dimensions of self-regulation could discriminate between athletes of different levels (Cleary & Zimmerman, 2001; Kitsantas & Zimmerman, 2002; Toering et al., 2009; Jonker et al., 2010). Yet, the instruments used to measure athletes' self-regulation in previous studies were predominately based on generic inventories from non-sport domains. Moreover, although most of these measures had been assessed for reliability, few if any had been assessed for other measurement properties such as content or construct validity. This illustrated the need for more theoretically grounded, psychometrically-sound instruments for measuring self-regulation in sport. So, rather than adopting a non-domain measure of self-regulation, the second aim of this thesis was to develop a context-specific, self-report instrument that could be used by golfers to record their tournament preparation behaviours in competition scenarios.

In Study III, the TPF-SR was developed and provides a robust instrument that can be self-administered by golfers to record their behaviours in tournament preparation. The TPF-SR builds on the approach of Anshel and colleagues (Anshel, 1995; Anshel & Porter, 1996) who developed a questionnaire to measure swimmer's self-regulation through interviews with coaches, swimmers, and a review of the extant literature. As pointed out by Glazier and Robins (2013) non-domain specific, terminology is not usually comprehensible by sport practitioners and can limit the practical contribution of instruments in sport. Additionally, the inability to effectively communicate research findings using appropriate language is one of the reasons why sport science, to date, has had a limited impact on applied practice (Williams & Kendall,

2007). A clear "user-friendly" instrument with terms and definitions that are understandable to the end-user might circumvent these issues and provide a more useable tool for stakeholders in the sport.

6.4 Practical Implications of the Research

The observed findings provide a stimulus for further research and may embolden key stakeholders to expand, and in some cases, challenge existing approaches to athlete development. Golf is a sport where many individuals develop applied frameworks, models, and content to guide and inform practice. Although, many of these contributions feature anecdotal content, with scarce empirical and theoretical support. In light of this, one of the aims of this thesis was to move beyond historic precedent and anecdotal evidence to develop a science-based framework for tournament preparation. The development of the TPF provides those working in the field with a robust tool that consolidates experts' opinions on tournament preparation. While still in its infancy, adoption of the framework may lead to the modification of education practices by GA and its member associations. For example, the TPF provides detailed information that may assist in the development of new tournament preparation "modules" that could be incorporated into education programs for golfers and trainee coaches. The TPF also presents easily applicable content for golfers to help structure their own preparation routines. Specifically, the framework could be made available to individual golfers via a mobile or web-based application; thereby encouraging golfers to become proactive participants in their own learning and development (Mallet, 2005). Further, as this one was one of the first studies to categorise and score preparatory behaviours in the literature, it could provide procedural guidelines for building curriculums in other sports as well as other areas of golf. For example, the use of a multimethod design that engages key stakeholders and consolidates their opinions into shared consensus has potential for

developing an all-encompassing curriculum that emphasises evidence-based practice in all areas of high-performance golf.

The TPF-SR instrument developed in Study III provides golfers with a standardised tool with which to monitor and capture data relating to their preparatory behaviours and cognitions in tournament preparation. While systematic data capture and athlete monitoring are becoming more common in golf, the TPF-SR allows golfers to record data relating to processes, rather than nomological or statistical data. For coaches and practitioners, captured data could be used to inform a screening process to identify strengths and deficiencies in golfers' preparation. This could assist with the structuring of individual preparation routines and enable coaches to better target these skills in training. Further, the TPF-SR could be used to improve golfers' awareness of preparatory behaviours and to emphasise adaptive self-regulatory behaviours (i.e., reflecting upon performance, self-monitoring etc.). Like the TPF, building this type of information into an augmented, web- or phone-based application could promote user-uptake and support more accurate data capture. For instance, an application that provides an interactive space for goal-setting, planning, active self-monitoring, and reflection/appraisal activities could help to reduce some of the methodological issues usually associated with retrospective recall (i.e., memory bias, forgetting etc.).

While the TPF-SR is practically useful for golf, the methods used in its development and the instrument itself could have wider applications across other sports. Self-report measures have received widespread uptake in recent years (Taylor et al., 2012), yet scarce information is available to guide the development of such measures in sport. Considering this, the multimethod design used to develop the TPF-SR and assess its validity could provide procedural guidelines for instrument development in other sports. In terms of its administration, the TPF-SR could be used by athletes to conduct detailed behavioural tracking both in

competition and training scenarios. The process of athletes self-administering the TPF-SR has practical value for athlete education by promoting the development of adaptive self-regulatory behaviours. Like technical skills, superior self-regulatory skills are only developed from extended periods of performing such processes in meaningful contexts (Ertmer & Newby, 1996); thus, an instrument that reinforces self-regulatory skill practice has significance across many sports. Administration of the instrument could also increase athletes' awareness of factors outside of training/competition that can impact performance; thereby, encouraging athletes to take ownership of factors that may typically be the remit of their coaching team (e.g., pre-competition planning). Data collected from the instrument could be used to inform coaches' decision-making regarding training design and programming. For example, such data could be used to conduct a screening process to identify strengths and weaknesses of athletes' preparation and target these areas with specific training interventions. Lastly, the collection of normative data could be used to inform longitudinal athlete benchmarking and curriculum building activities. Of course, the instrument should first be adjusted to meet the requirements of the sport. This may include, when necessary, being populated with sport- and context-specific items.

Additionally, the instrument offers utility for sports in which athletes have limited access to sport psychology services (SPS). Unlike other service provision such as technical coaching or physical conditioning that are part of an ongoing development program, in many programs sport psychology is restricted to sporadic group education sessions. For instance, studies in collegiate sports reported that only 24-53% of NCAA Division I athletic departments use SPS (Wilson, Gilbert, Gilbert, & Sailor, 2009; Voight & Callaghan, 2001) and those that do tend to use it as a type of "special event" for team practice (Zakrajsek, Steinfeldt, Bodey, Martin, & Zizzi, 2013). This ad hoc approach provides general information about mental skills training, but few opportunities for ongoing skill development. For these programs, a self-report

instrument administered by athletes could provide valuable data and insights to practitioners that would not normally be available. Notably, such data provides opportunities for practitioners to conduct needs assessments to guide appropriate content delivery; thereby, maximising the efficiency of their allocated time and enabling more productive interactions to take place (Visek, Harris, & Blom, 2009).

In Study IV, golfers' endorsement of items from the TPF-SR was shown to discriminate between those of different rankings. These findings provide initial evidence as to which behaviours should be targeted by coaches during training and preparation to maximise scoring success. In high-performance (amateur) golf, time devoted to preparatory skills is limited as coaches tend to focus on other aspects of performance such as technical, physical, and tactical skill development. Thus, information relating to which behaviours are most important may inform the development of more time efficient strategies for coaches and other practitioners when working with golfers. A consideration of the measurement properties assessed in Study IV could also serve to provide guidelines for other researchers or analysts looking to analyse binary, behavioural data. While numerous approaches continue to be used to examine relationships in sport performance analysis and research, the approaches used in this thesis to deal with self-report data could be considered novel to the discipline. Therefore, these techniques or approaches may warrant consideration by those currently working in golf or other sports when examining this type of self-report, monitoring data.

6.5 Strengths and Limitations of this Doctoral Investigation

6.5.1 Strengths

A key strength of this doctoral thesis was the adoption of a well-established, conceptual framework (i.e., self-regulation) to guide research design and content development. Another

strength was the research process used to produce the TPF-SR instrument. Specifically, the development of the TPF-SR followed a rigorous process comprised of exploratory interviews, an iterative Delphi study, and multi-stage instrument validation in which content was refined and trustworthiness enhanced over a series of studies. Notably, the sample recruited to take part in these studies were considered representative of the key stakeholders in Australian high-performance golf. Based on the recruitment and participation of these individuals, the framework and corresponding self-report instrument are well-placed for uptake in the sport.

6.5.2 Limitations

For Study I, the sample recruited to participate in the qualitative interviews included only elite amateur golfers. The themes that emerged from these interviews were used to generate the Delphi questionnaire in Study II. It is possible that this approach limited the scope of the research, or even biased the initial "pool" of items that were included in the first-round Delphi; that is, the items generated may have been relevant to elite amateur golfers, but less relevant to other groups such as professional golfers. To circumvent this issue, participants were given the opportunity to provide comments and feedback on the initial list of items or even to suggest additional items after the first Delphi round. Further, in qualitative inquiry, researchers closely engage with participants and the research process and are therefore unable to completely avoid personal bias (Tong, Sainsbury & Craig, 2007). Rather, a more pragmatic approach for researchers is to exercise reflexivity by acknowledging the effect their background may have on their understanding of the phenomena and the participant's responses; and, to take steps to minimise bias whenever possible (Tong, Sainsbury & Craig, 2007; Malterud, 2001). With this in mind, it should be noted that the author of this thesis had an ongoing professional relationship with GA coaches, athletes, and other key stakeholders during the production of this work. In order to mitigate the effect of the author's previous experiences

influencing their engagement with the data, bracketing was employed. Bracketing involved the author maintaining a reflexivity journal to help separate or 'bracket' thoughts or ideas from personal bias; enabling the author to preserve objectivity by remaining cognizant of his positionality in the context of the research (Tufford & Newman, 2010). Further, while many participants of this research were contacted through the author's personal contacts, care was taken to ensure there was incentive or indeed encumbrance – both professionally and personally – relating to their participation/non-participation in the research.

While international experts were invited to participate in the Study II Delphi, the final panel was comprised of mostly participants from Australia; therefore, their opinions and the observed findings may be specific to this geographic region. As a result, studies performed in other countries may support or challenge the importance of items and the composition of the final framework. It should also be noted that the final panel comprised mostly coaches, with only a small number of players, academics, and high-performance staff. Based on this panel, some may argue that the findings were reflective of the historic precedent the study set out to avoid or could be considered a "non-scientific" contribution. However, it should be mentioned that the coaches invited to participate were not necessarily reflective of the "typical" golf coach and had extensive experience in high-performance coaching environments.

A potential limitation to Study III was that the observation/interview data was not collected for the same tournament as the self-report data. This may have reduced the accuracy of any direct comparisons between the two measures, as differences could reflect contextual factors pertaining to the tournament, rather than the endorsement of specific items. Regarding the administration of the TPF-SR in Study III and Study IV, self-report, retrospective measures are inherently vulnerable to measurement error from both unconscious (e.g., recall error) and conscious bias (e.g., memory biases) (Ekegren, Donaldson, Gabbe, & Finch, 2014). Conscious

bias may reflect efforts to respond in a socially desirable fashion by over- or under-reporting specific responses; essentially "faking good". Like most self-report measures, the items from the TPF-SR were relatively transparent and susceptible to response distortion. That is, players could predict the favourable or "socially desirable" response and "fake good" to present a positive image of themselves (Smith et al., 2005). Acquiescent responding – participants' tendency to agree with items regardless of content, could also have influenced research findings (Vaerenbergh & Thomas, 2012). Specifically, over-reporting can contribute to systematic error by inflating aggregate item endorsements and is recognised as a threat to validity (Vaerenbergh & Thomas, 2012). At a minimum, future researchers or practitioners should be cognizant of the possibilities of response distortion when using the TPF-SR.

The golfers recruited for Study III and Study IV were categorised as amateur, and therefore, the results may not be generalisable to players of higher (world-class/professional) levels. In other words, the TPF-SR instrument may only prove valid for use with this specific sample of players. Second, there was no assessment of whether the discriminative ability of instrument items is persistent across extended periods of time. Specifically, golfers self-administered the TFP-SR for a single tournament; thus, longer term monitoring of tournament preparation behaviours may produce different results. Last, while these findings provide information on the ability of specific tournament preparation behaviours to discriminate between golfers on the basis of ranking, it does not establish at a behavioural level how these activities relate to performance. That is, whether completing more or specific behaviours from the framework translates to concomitant performance benefits.

6.6 Future Research Directions

First, given that the TPF, and the way it was derived is novel to the sport, to truly verify the efficacy and impact of the framework, qualitative research may be valuable to assess the user-uptake and acceptability for golfers and coaches. For example, the framework could be delivered to a group of coaches and following a period of familiarisation, interviews could be performed to examine participants' perceptions of the framework. Further, as mentioned above, a region-specific approach was used to develop the TPF; thus, future studies may wish to consider a cross-cultural analysis when undertaking research in this area and test for any differences in the developed framework. This could be achieved by first asking participants from different national golf programs to take part in a Delphi to score the importance of items from the TPF and then comparing the results with those observed herein.

While this doctoral thesis evaluates different validity dimensions of the TPF-SR, it is important to note that instrument validation is an ongoing process (Messick, 1989). So, future research to replicate and extend this preliminary validation work by investigating other validity dimensions is warranted. For example, using the findings of this thesis as a guide, future experimental studies may be valuable to provide a more rigorous evaluation of behaviour-performance relationships. In order to improve the validity of information regarding the preparatory behaviours of sports performers for research and practice, it may also be beneficial to investigate the application and feasibility of developing technologies such as wearable sensors or real-time behavioural monitoring. The maintenance of weekly audio diaries to determine the microstructure of preparatory activities should also be considered. In effect, this approach would allow researchers to assess the specific content and duration of practice and preparation activities such as amounts of deliberate practice undertaken, and time spent receiving feedback from a coach or performing warm-up and recovery protocols.

Based on the scores provided by the expert panel in Study II, there were many task-specific and self-regulatory behaviours important for golfers before and during tournaments. For example, planning and organising nutrition, using specific travel-management strategies, implementing specific mental and physical preparation routines, using specific post-round recovery techniques, managing organisational stressors, and, reflecting/evaluating on performance. Yet, despite some examination of normative endorsement rates from a relatively small sample in Study III, there remains little indication of what proportion of golfers perform these types of behaviours during tournament preparation. Thus, further self-administration of the TPF-SR by golfers could provide valuable information in this area.

The investigation into the measurement properties of this instrument in Study III and Study IV provides evidence with respect to the confidence in the inferences developed from its administration, although additional validation work is recommended. It also allows the TPF-SR to be used for the purpose of further research. For example, it could be used to examine how golfers' endorsement of items from the instrument is associated with tournament performance.

REFERENCES

Anshel, M.H. (1995). An examination of self-regulatory cognitive-behavioural strategies of Australian elite and non-elite competitive male swimmers. *Australian Psychologist, 30,* 78-83.

Anshel, M. H., & Porter, A. (1996). Self-regulatory characteristics of competitive swimmers as a function of skill level and gender. *Journal of Sport Behaviour*, *19*, 91-110.

Cleary, T. J., & Zimmerman, B. J. (2001). Self-regulation differences during athletic practice by experts, non-experts, and novices. *Journal of Applied Sport Psychology*, *13*, 185-206.

Cleary, T. J., Callan, G., & Zimmerman, B. J. (2012). Assessing self-regulation as a cyclical, context-specific phenomenon: Overview and analysis of SRL microanalytic protocols. *Education Research International*, 1-19.

Ekegren, C.L., Donaldson, A., Gabbe, B.J., & Finch, C.F. (2014). Implementing injury surveillance systems alongside injury prevention programs: Evaluation of an online surveillance system in a community setting. *Injury Epidemiology, 1,* 1-15.

Ertmer, P. A., & Newby, T. J. (1996). The expert learner: Strategic, self-regulated, and reflective. *Instructional Science, 24,* 1-24.

Jonker, L., Elferink-Gemser, M.T., & Visscher, C. (2010). Differences in self-regulatory skills among talented athletes: The significance of competitive level and type of sport. *Journal of Sports Sciences, 28,* 901-908.

Kitsantas, A., & Zimmerman, B. J. (2002). Comparing self-regulatory processes among novice, non-expert, and expert volleyball players: A microanalytic study. *Journal of Applied Sport Psychology, 14,* 91-105.

Mallet, C. J. (2005). Self-determination theory: A case study of evidence-based coaching. *The Sport Psychologist, 19,* 417–429.

Malterud, K. (2001). Qualitative research: Standards, challenges, and guidelines. *The Lancet*, *358*, 483-488.

Panadero, E. (2017). A review of self-regulated learning: Six models and four directions for research. *Frontiers in Psychology, 8*, 422.

Smith, S.C., Lamping, D.L., Banerjee, S., Harwood, R., Foley, B., Smith, P., … Knapp, M. (2005). Measurement of health-related quality of life with dementia: Development of a new instrument (DEMQOL) and an evaluation of current methodology. *Health Technology Assessment, 9,* 1-93.

Taylor, K., Chapman, D., Cronin, J., Newton, M. J., & Gill, N. (2012). Fatigue monitoring in high performance sport: A survey of current trends. *Journal of Australian Strength Conditioning*, *20*, 12-23.

Toering, T.T., Elferink-Gemser, M.T., Jordet, G., & Visscher, C. (2009). Self-regulation and performance level of elite and non-elite youth soccer players. *Journal of Sports Sciences, 27*, 1509-1517.

Tong, A., Sainsbury, P., & Craig, J. (2007). Consolidated criteria for reporting qualitative research (COREQ): A 32-item checklist for interviews and focus groups. *International Journal for Quality in Health Care*, *19*, 349-357.

Tufford, L., & Newman, P. (2012). Bracketing in qualitative research. *Qualitative Social Work*, *11*, 80-96.

Vaerenbergh, Y. V., & Thomas, T. D. (2012). Response styles in survey research: A literature review of antecedents, consequences and remedies. *International Journal of Public Opinion Research, 25*, 195–217.

van de Mortel, T.F. (2008). Faking it: Social desirability response bias in self-report research. *Australian Journal of Advanced Nursing*, *25*, 40-48.

Visek, A. J., Harris, B. S., & Blom, L. C. (2009). Doing sport psychology: A youth sport consulting model for practitioners. *The Sport Psychologist, 23,* 271-291.

Voight, M., & Callaghan, J. (2001). The use of sport psychology services at NCAA Division I universities. *The Sport Psychologist, 15,* 91–102.

Williams, S. J., & Kendall, L. (2007). Perceptions of elite coaches and sports scientists of the research needs for elite coaching practice. *Journal of Sports Sciences*, *25*, 1577-1586.

Wilson, K.A., Gilbert, J.N., Gilbert, W.D., & Sailor, S.R. (2009). College athletic directors' perceptions of sport psychology consulting. *The Sport Psychologist, 23,* 405–424.

Zakrajsek, R. A., Steinfeldt, J. A., Bodey, K. J., Martin, S. B., & Zizzi, S. J. (2013). NCAA Division I coaches' perceptions and preferred use of sport psychology services: A qualitative perspective. *The Sport Psychologist, 27,* 258-268.

Zimmerman, B.J. (2000). Attainment of self-regulation: A social cognitive perspective. In M. Boekaerts, P.R. Pintrich, & M. Zeidner (Eds.), *Handbook of self-regulation* (pp. 13-39). San Diego, CA: Academic Press.

APPENDICES

Appendix 1

The framework developed from the findings of the Delphi research in Study II. The framework is comprised of a ranked list of items that display importance relative to different participant levels.

Appendix 1a

Tournament preparation framework – Elite junior amateur	Score on 5-point Likert-type scale
Mapping the course to identify the important features and details, such as (a) the speed and slope of the greens, (b) the location of hazards, (c) the types of grasses, (d) the key yardages, (e) the approach paths to the greens, (f) the prevailing wind, (g) the shot types and distances that are important for the course. In addition, using this information to develop a strategy or game plan for on-course play (i.e., what shots to play and what clubs to use for each hole).	5
Organising a reliable mode of transport to the course (return) for the week.	5
Contacting the tournament office before arrival to book a time for practice round (s).	5
Using an individualised system of pre-round preparation that can be adapted depending on the availability of practice facilities, arrival time to the course and the weather or climatic conditions and may include (a) a physical warm-up (stretching, self-massage, mobility work), and (b) a technical warm-up or practice routine (putting, chipping, range work etc.).	4
Using a tool-kit of mental resources (helpful cognitions, appropriate cues and coping strategies), that may include a mental preparation routine before each round to manage ineffective stress and anxiety.	4
Being able to self-manage the swing and self-correct when required.	4

Being able to regulate attention to 'switch on' and engage mentally when preparing to tee off, and 'switch off' after each round.	4
Using an individualised program of post-flight and post-round recovery, that may include a) stretching, b) cold water immersion, c) contrast therapy, d) self-massage, e) mobility exercises.	4
Developing a time management plan that includes travel time to the course and between various practice facilities, as well as time allocated for pre-round preparation activities.	4
Completing at least two practice rounds (when possible)	4
Structuring technical/shot practice relevant to the playing conditions of the tournament course and the player's self-assessed strengths and weaknesses.	4
Using strategies to manage jet-lag for long-haul travel and help adjust to local time at the tournament venue, that may include: a) structuring sleeping patterns for the in-flight and post-flight periods and, b) using the time intake of caffeine and exposure to natural light to delay sleep.	4
Reflecting on and evaluating performance and preparation post-tournament and recording information to identify and examine trends over time.	4
Using a strategy for nutrition and hydration during long-haul travel, that may include: a) sufficient pre-flight, in-flight and post-flight fluid intake, b) preparing food for the flight and, c) structuring meals to correspond with normal eating periods at the tournament venue.	4
Re-calibrating club distances at the practice range or on-course (depending on the facilities and the quality of the range balls available) if the atmospheric conditions are significantly different than those of the player's local base.	4
Using a consistent system of preparation that can be adapted depending on (a) the weather or climatic conditions, (b) the availability of practice and training facilities, (c) the player's physical or mental condition (fatigue, injury status etc.) and, (d) access to the course (e.g., limited access due to sponsors day etc.).	4
Planning objectives or process goals for each day of preparation.	4

Monitoring preparation and making adjustments to daily goals or objectives when required.	4
Assessing the facilities (e.g., training or practice facilities, supermarket etc.) available at the tournament course and in the local area, either prior to or upon arrival at the venue.	4
Planning and preparing meals for the tournament week and implementing a strategy for hydration that is appropriate for the climate of the venue.	4
Organising preparation so that practice activities are tapered or reduced leading up to the first round of competition.	4
Visualising the course layout and rehearsing the specific shots for each hole to ensure shot-practice is directed and purposeful.	4
Completing an individualised strength and conditioning program during the tournament week that may include a reduced or maintenance style of training and depend on the player's competitive schedule and the recommendations of the conditioning coach.	4
Monitoring physical (e.g., fatigue) and mental condition and using this feedback to adjust practice activities as required.	4
Evaluating preparation day-to-day and using this feedback to guide planning for further days of preparation.	4
Structuring pre-round technical or shot-practice to match the course conditions and hitting a variety of distances, clubs and shot types as per the player's course strategy.	4
Reflecting on the game plan and strategy for the course before each round.	4
Using a relatively consistent routine for AM and PM tee times that can be adapted depending on the time available (e.g., early AM tee times).	4
Using self-report computer software (e.g., ShotstoHole) programs or paper-based notes to record statistical information after each round.	4
Evaluating performance after each round at a technical, psychological, physical and tactical level and adjusting strategy as required.	4

Monitoring weather conditions and the state of the player's game day-to-day and using this information to adjust the strategy for the course as required.	4
Adjusting preparation for future tournaments based on the feedback and information gained from self-reflection and evaluation.	4
Completing a post-tournament debrief with the coach.	4
Recording self-reflection/evaluation after each round.	4
Developing a financial plan or budget for the tournament.	4
Performing a physical check to determine if an area of the body that may be the source of previous injury or concern requires more focus in the warm-up.	3.5
Practicing skills or shot-types that weren't performed well on the course, either post-round or prior the start of the next round.	3.5
Adjusting equipment set-up and bag configuration to match the playing conditions of the course.	3
Arriving to the tournament venue at least 3-4 days prior to the first round of competition for long-haul travel.	3
Using internet-based tools (e.g., Google maps) to familiarise themselves with the course layout and inform practice, as well as to develop a course guide	3
Performing a debrief/evaluation with the caddie post-round	3
Minimising practice drills during the tournament week that significantly change or alter the player's swing pattern	3
Performing a debrief with the coach post-round to evaluate decision-making and discuss the positive aspects of their performance, while minimising technical evaluation or analysis.	3
Contacting the coach for advice following a poor performance.	3

Practicing skills or shot-types that were performed well on the course, either post-round or prior the start of the next round.	3
Contacting a sports psychologist or practitioners for a post-round debrief.	2.5
Setting outcome or scoring goals for the tournament.	2
Dedicating less time to course mapping and more to shot practice and if the player has experience playing the course and additional shot preparation is required.	2

Appendix 1b

Tournament preparation framework – Elite senior amateur	Score on 5-point Likert-type scale
Mapping the course to identify the important features and details, such as (a) the speed and slope of the greens, (b) the location of hazards, (c) the types of grasses, (d) the key yardages, (e) the approach paths to the greens, (f) the prevailing wind, (g) the shot types and distances that are important for the course. In addition, using this information to develop a strategy or game plan for on-course play (i.e., what shots to play and what clubs to use for each hole).	5
Organising a reliable mode of transport to the course (return) for the week.	5
Using an individualised system of pre-round preparation that can be adapted depending on the availability of practice facilities, arrival time to the course and the weather or climatic conditions and may include (a) a physical warm-up (stretching, self-massage, mobility work), and (b) a technical warm-up or practice routine (putting, chipping, range work etc.).	4
Using a tool-kit of mental resources (helpful cognitions, appropriate cues and coping strategies), that may include a mental preparation routine before each round to manage ineffective stress and anxiety.	4
Being able to self-manage the swing and self-correct when required.	4
Being able to regulate attention to 'switch on' and engage mentally when preparing to tee off, and 'switch off' after each round.	4
Using an individualised program of post-flight and post-round recovery, that may include a) stretching, b) cold water immersion, c) contrast therapy, d) self-massage, e) mobility exercises.	4
Developing a time management plan that includes travel time to the course and between various practice facilities, as well as time allocated for pre-round preparation activities.	4
Completing at least two practice rounds (when possible).	4

Structuring technical/shot practice relevant to the playing conditions of the tournament course and the player's self-assessed strengths and weaknesses.	4
Contacting the tournament office before arrival to book a time for practice round (s).	4
Using strategies to manage jet-lag for long-haul travel and help adjust to local time at the tournament venue, that may include: a) structuring sleeping patterns for the in-flight and post-flight periods and, b) using the time intake of caffeine and exposure to natural light to delay sleep.	4
Reflecting on and evaluating performance and preparation post-tournament and recording information to identify and examine trends over time.	4
Using a strategy for nutrition and hydration during long-haul travel, that may include: a) sufficient pre-flight, in-flight and post-flight fluid intake, b) preparing food for the flight and, c) structuring meals to correspond with normal eating periods at the tournament venue.	4
Re-calibrating club distances at the practice range or on-course (depending on the facilities and the quality of the range balls available) if the atmospheric conditions are significantly different than those of the player's local base.	4
Using a consistent system of preparation that can be adapted depending on (a) the weather or climatic conditions, (b) the availability of practice and training facilities, (c) the player's physical or mental condition (fatigue, injury status etc.) and, (d) access to the course (e.g., limited access due to sponsors day etc.).	4
Planning objectives or process goals for each day of preparation.	4
Monitoring preparation and making adjustments to daily goals or objectives when required.	4
Assessing the facilities (e.g., training or practice facilities, supermarket etc.) available at the tournament course and in the local area, either prior to or upon arrival at the venue.	4
Planning and preparing meals for the tournament week and implementing a strategy for hydration that is appropriate for the climate of the venue.	4

Organising preparation so that practice activities are tapered or reduced leading up to the first round of competition.	4
Visualising the course layout and rehearsing the specific shots for each hole to ensure shot-practice is directed and purposeful.	4
Completing an individualised strength and conditioning program during the tournament week that may include a reduced or maintenance style of training and depend on the player's competitive schedule and the recommendations of the conditioning coach.	4
Monitoring physical (e.g., fatigue) and mental condition and using this feedback to adjust practice activities as required.	4
Evaluating preparation day-to-day and using this feedback to guide planning for further days of preparation.	4
Structuring pre-round technical or shot-practice to match the course conditions and hitting a variety of distances, clubs and shot types as per the player's course strategy.	4
Reflecting on the game plan and strategy for the course before each round.	4
Using a relatively consistent routine for AM and PM tee times that can be adapted depending on the time available (e.g., early AM tee times).	4
Using self-report computer software (e.g., ShotstoHole) programs or paper-based notes to record statistical information after each round.	4
Evaluating performance after each round at a technical, psychological, physical and tactical level and adjusting strategy as required.	4
Monitoring weather conditions and the state of the player's game day-to-day and using this information to adjust the strategy for the course as required.	4
Adjusting preparation for future tournaments based on the feedback and information gained from self-reflection and evaluation.	4
Completing a post-tournament debrief with the coach.	4

Performing a physical check to determine if an area of the body that may be the source of previous injury or concern requires more focus in the warm-up.	4
Practicing skills or shot-types that weren't performed well on the course, either post-round or prior the start of the next round.	4
Developing a financial plan or budget for the tournament.	4
Using internet-based tools (e.g., Google maps) to familiarise themselves with the course layout and inform practice, as well as to develop a course guide.	4
Recording self-reflection/evaluation after each round.	3.5
Adjusting equipment set-up and bag configuration to match the playing conditions of the course.	3
Arriving to the tournament venue at least 3-4 days prior to the first round of competition for long-haul travel.	3
Performing a debrief/evaluation with the caddie post-round.	3
Minimising practice drills during the tournament week that significantly change or alter the player's swing pattern.	3
Performing a debrief with the coach post-round to evaluate decision-making and discuss the positive aspects of their performance, while minimising technical evaluation or analysis.	3
Contacting the coach for advice following a poor performance.	3
Practicing skills or shot-types that were performed well on the course, either post-round or prior the start of the next round.	3
Setting outcome or scoring goals for the tournament.	3
Contacting a sports psychologist or practitioners for a post-round debrief.	2.5

Dedicating less time to course mapping and more to shot practice and if the player has experience playing the course and additional shot preparation is required.	2

Appendix 1c

Tournament preparation framework – Australian touring professional	Score on 5-point Likert-type scale
Mapping the course to identify the important features and details, such as (a) the speed and slope of the greens, (b) the location of hazards, (c) the types of grasses, (d) the key yardages, (e) the approach paths to the greens, (f) the prevailing wind, (g) the shot types and distances that are important for the course. In addition, using this information to develop a strategy or game plan for on-course play (i.e., what shots to play and what clubs to use for each hole).	5
Organising a reliable mode of transport to the course (return) for the week.	5
Using an individualised system of pre-round preparation that can be adapted depending on the availability of practice facilities, arrival time to the course and the weather or climatic conditions and may include (a) a physical warm-up (stretching, self-massage, mobility work), and (b) a technical warm-up or practice routine (putting, chipping, range work etc.).	5
Using a tool-kit of mental resources (helpful cognitions, appropriate cues and coping strategies), that may include a mental preparation routine before each round to manage ineffective stress and anxiety.	5
Being able to self-manage the swing and self-correct when required.	5
Being able to regulate attention to 'switch on' and engage mentally when preparing to tee off, and 'switch off' after each round.	5
Using an individualised program of post-flight and post-round recovery, that may include a) stretching, b) cold water immersion, c) contrast therapy, d) self-massage, e) mobility exercises.	4
Developing a time management plan that includes travel time to the course and between various practice facilities, as well as time allocated for pre-round preparation activities.	4
Completing at least two practice rounds (when possible)/.	4

Structuring technical/shot practice relevant to the playing conditions of the tournament course and the player's self-assessed strengths and weaknesses.	4
Contacting the tournament office before arrival to book a time for practice round (s).	4
Using strategies to manage jet-lag for long-haul travel and help adjust to local time at the tournament venue, that may include: a) structuring sleeping patterns for the in-flight and post-flight periods and, b) using the time intake of caffeine and exposure to natural light to delay sleep.	4
Reflecting on and evaluating performance and preparation post-tournament and recording information to identify and examine trends over time.	4
Using a strategy for nutrition and hydration during long-haul travel, that may include: a) sufficient pre-flight, in-flight and post-flight fluid intake, b) preparing food for the flight and, c) structuring meals to correspond with normal eating periods at the tournament venue.	4
Re-calibrating club distances at the practice range or on-course (depending on the facilities and the quality of the range balls available) if the atmospheric conditions are significantly different than those of the player's local base.	4
Using a consistent system of preparation that can be adapted depending on (a) the weather or climatic conditions, (b) the availability of practice and training facilities, (c) the player's physical or mental condition (fatigue, injury status etc.) and, (d) access to the course (e.g., limited access due to sponsors day etc.).	4
Planning objectives or process goals for each day of preparation.	4
Monitoring preparation and making adjustments to daily goals or objectives when required.	4
Assessing the facilities (e.g., training or practice facilities, supermarket etc.) available at the tournament course and in the local area, either prior to or upon arrival at the venue.	4
Planning and preparing meals for the tournament week and implementing a strategy for hydration that is appropriate for the climate of the venue.	4

Organising preparation so that practice activities are tapered or reduced leading up to the first round of competition.	4
Visualising the course layout and rehearsing the specific shots for each hole to ensure shot-practice is directed and purposeful.	4
Completing an individualised strength and conditioning program during the tournament week that may include a reduced or maintenance style of training and depend on the player's competitive schedule and the recommendations of the conditioning coach.	4
Monitoring physical (e.g., fatigue) and mental condition and using this feedback to adjust practice activities as required.	4
Evaluating preparation day-to-day and using this feedback to guide planning for further days of preparation.	4
Structuring pre-round technical or shot-practice to match the course conditions and hitting a variety of distances, clubs and shot types as per the player's course strategy.	4
Reflecting on the game plan and strategy for the course before each round.	4
Using a relatively consistent routine for AM and PM tee times that can be adapted depending on the time available (e.g., early AM tee times).	4
Using self-report computer software (e.g., ShotstoHole) programs or paper-based notes to record statistical information after each round.	4
Evaluating performance after each round at a technical, psychological, physical and tactical level and adjusting strategy as required.	4
Monitoring weather conditions and the state of the player's game day-to-day and using this information to adjust the strategy for the course as required.	4
Adjusting preparation for future tournaments based on the feedback and information gained from self-reflection and evaluation.	4
Completing a post-tournament debrief with the coach.	4

Performing a physical check to determine if an area of the body that may be the source of previous injury or concern requires more focus in the warm-up.	4
Recording self-reflection/evaluation after each round.	4
Practicing skills or shot-types that weren't performed well on the course, either post-round or prior the start of the next round.	4
Adjusting equipment set-up and bag configuration to match the playing conditions of the course.	4
Developing a financial plan or budget for the tournament.	4
Arriving to the tournament venue at least 3-4 days prior to the first round of competition for long-haul travel.	4
Using internet-based tools (e.g., Google maps) to familiarise themselves with the course layout and inform practice, as well as to develop a course guide.	4
Performing a debrief/evaluation with the caddie post-round.	3
Minimising practice drills during the tournament week that significantly change or alter the player's swing pattern.	3
Performing a debrief with the coach post-round to evaluate decision-making and discuss the positive aspects of their performance, while minimising technical evaluation or analysis.	3
Contacting the coach for advice following a poor performance.	3
Practicing skills or shot-types that were performed well on the course, either post-round or prior the start of the next round.	3
Setting outcome or scoring goals for the tournament.	3
Contacting a sports psychologist or practitioners for a post-round debrief.	3

Dedicating less time to course mapping and more to shot practice and if the player has experience playing the course and additional shot preparation is required.	2

Appendix 1d

Tournament preparation framework – International touring professional	Score on 5-point Likert-type scale
Mapping the course to identify the important features and details, such as (a) the speed and slope of the greens, (b) the location of hazards, (c) the types of grasses, (d) the key yardages, (e) the approach paths to the greens, (f) the prevailing wind, (g) the shot types and distances that are important for the course. In addition, using this information to develop a strategy or game plan for on-course play (i.e., what shots to play and what clubs to use for each hole).	5
Using an individualised system of pre-round preparation that can be adapted depending on the availability of practice facilities, arrival time to the course and the weather or climatic conditions and may include (a) a physical warm-up (stretching, self-massage, mobility work), and (b) a technical warm-up or practice routine (putting, chipping, range work etc.).	5
Using a tool-kit of mental resources (helpful cognitions, appropriate cues and coping strategies), that may include a mental preparation routine before each round to manage ineffective stress and anxiety.	5
Being able to self-manage the swing and self-correct when required.	5
Being able to regulate attention to 'switch on' and engage mentally when preparing to tee off, and 'switch off' after each round.	5
Using an individualised program of post-flight and post-round recovery, that may include a) stretching, b) cold water immersion, c) contrast therapy, d) self-massage, e) mobility exercises.	5
Developing a time management plan that includes travel time to the course and between various practice facilities, as well as time allocated for pre-round preparation activities.	5
Completing at least two practice rounds (when possible).	5
Organising a reliable mode of transport to the course (return) for the week.	4.5

Reflecting on and evaluating performance and preparation post-tournament and recording information to identify and examine trends over time.	4.5
Structuring technical/shot practice relevant to the playing conditions of the tournament course and the player's self-assessed strengths and weaknesses.	4
Contacting the tournament office before arrival to book a time for practice round (s).	4
Using strategies to manage jet-lag for long-haul travel and help adjust to local time at the tournament venue, that may include: a) structuring sleeping patterns for the in-flight and post-flight periods and, b) using the time intake of caffeine and exposure to natural light to delay sleep.	4
Using a strategy for nutrition and hydration during long-haul travel, that may include: a) sufficient pre-flight, in-flight and post-flight fluid intake, b) preparing food for the flight and, c) structuring meals to correspond with normal eating periods at the tournament venue.	4
Re-calibrating club distances at the practice range or on-course (depending on the facilities and the quality of the range balls available) if the atmospheric conditions are significantly different than those of the player's local base.	4
Using a consistent system of preparation that can be adapted depending on (a) the weather or climatic conditions, (b) the availability of practice and training facilities, (c) the player's physical or mental condition (fatigue, injury status etc.) and, (d) access to the course (e.g., limited access due to sponsors day etc.).	4
Planning objectives or process goals for each day of preparation.	4
Monitoring preparation and making adjustments to daily goals or objectives when required.	4
Assessing the facilities (e.g., training or practice facilities, supermarket etc.) available at the tournament course and in the local area, either prior to or upon arrival at the venue.	4
Planning and preparing meals for the tournament week and implementing a strategy for hydration that is appropriate for the climate of the venue.	4

Organising preparation so that practice activities are tapered or reduced leading up to the first round of competition.	4
Visualising the course layout and rehearsing the specific shots for each hole to ensure shot-practice is directed and purposeful.	4
Completing an individualised strength and conditioning program during the tournament week that may include a reduced or maintenance style of training and depend on the player's competitive schedule and the recommendations of the conditioning coach.	4
Monitoring physical (e.g., fatigue) and mental condition and using this feedback to adjust practice activities as required.	4
Evaluating preparation day-to-day and using this feedback to guide planning for further days of preparation.	4
Structuring pre-round technical or shot-practice to match the course conditions and hitting a variety of distances, clubs and shot types as per the player's course strategy.	4
Reflecting on the game plan and strategy for the course before each round.	4
Using a relatively consistent routine for AM and PM tee times that can be adapted depending on the time available (e.g., early AM tee times).	4
Using self-report computer software (e.g., ShotstoHole) programs or paper-based notes to record statistical information after each round.	4
Evaluating performance after each round at a technical, psychological, physical and tactical level and adjusting strategy as required.	4
Monitoring weather conditions and the state of the player's game day-to-day and using this information to adjust the strategy for the course as required.	4
Adjusting preparation for future tournaments based on the feedback and information gained from self-reflection and evaluation.	4
Completing a post-tournament debrief with the coach.	4

Performing a physical check to determine if an area of the body that may be the source of previous injury or concern requires more focus in the warm-up.	4
Recording self-reflection/evaluation after each round.	4
Practicing skills or shot-types that weren't performed well on the course, either post-round or prior the start of the next round.	4
Adjusting equipment set-up and bag configuration to match the playing conditions of the course.	4
Performing a debrief/evaluation with the caddie post-round.	4
Arriving to the tournament venue at least 3-4 days prior to the first round of competition for long-haul travel.	3.5
Developing a financial plan or budget for the tournament.	3
Using internet-based tools (e.g., Google maps) to familiarise themselves with the course layout and inform practice, as well as to develop a course guide.	3
Minimising practice drills during the tournament week that significantly change or alter the player's swing pattern.	3
Performing a debrief with the coach post-round to evaluate decision-making and discuss the positive aspects of their performance, while minimising technical evaluation or analysis.	3
Contacting the coach for advice following a poor performance.	3
Practicing skills or shot-types that were performed well on the course, either post-round or prior the start of the next round.	3
Setting outcome or scoring goals for the tournament.	3
Contacting a sports psychologist or practitioners for a post-round debrief.	3

Dedicating less time to course mapping and more to shot practice and if the player has experience playing the course and additional shot preparation is required.	2

Appendix 1e

Tournament preparation framework – Major champion or Olympic player	Score on 5-point Likert-type scale
Mapping the course to identify the important features and details, such as (a) the speed and slope of the greens, (b) the location of hazards, (c) the types of grasses, (d) the key yardages, (e) the approach paths to the greens, (f) the prevailing wind, (g) the shot types and distances that are important for the course. In addition, using this information to develop a strategy or game plan for on-course play (i.e., what shots to play and what clubs to use for each hole).	5
Using an individualised system of pre-round preparation that can be adapted depending on the availability of practice facilities, arrival time to the course and the weather or climatic conditions and may include (a) a physical warm-up (stretching, self-massage, mobility work), and (b) a technical warm-up or practice routine (putting, chipping, range work etc.).	5
Using a tool-kit of mental resources (helpful cognitions, appropriate cues and coping strategies), that may include a mental preparation routine before each round to manage ineffective stress and anxiety.	5
Being able to self-manage the swing and self-correct when required.	5
Being able to regulate attention to 'switch on' and engage mentally when preparing to tee off, and 'switch off' after each round.	5
Using an individualised program of post-flight and post-round recovery, that may include a) stretching, b) cold water immersion, c) contrast therapy, d) self-massage, e) mobility exercises.	5
Developing a time management plan that includes travel time to the course and between various practice facilities, as well as time allocated for pre-round preparation activities.	5
Completing at least two practice rounds (when possible).	5
Structuring technical/shot practice relevant to the playing conditions of the tournament course and the player's self-assessed strengths and weaknesses.	5

Using strategies to manage jet-lag for long-haul travel and help adjust to local time at the tournament venue, that may include: a) structuring sleeping patterns for the in-flight and post-flight periods and, b) using the time intake of caffeine and exposure to natural light to delay sleep.	5
Reflecting on and evaluating performance and preparation post-tournament and recording information to identify and examine trends over time.	4.5
Using a strategy for nutrition and hydration during long-haul travel, that may include: a) sufficient pre-flight, in-flight and post-flight fluid intake, b) preparing food for the flight and, c) structuring meals to correspond with normal eating periods at the tournament venue.	4.5
Re-calibrating club distances at the practice range or on-course (depending on the facilities and the quality of the range balls available) if the atmospheric conditions are significantly different than those of the player's local base.	4.5
Organising a reliable mode of transport to the course (return) for the week.	4
Contacting the tournament office before arrival to book a time for practice round (s).	4
Using a consistent system of preparation that can be adapted depending on (a) the weather or climatic conditions, (b) the availability of practice and training facilities, (c) the player's physical or mental condition (fatigue, injury status etc.) and, (d) access to the course (e.g., limited access due to sponsors day etc.).	4
Planning objectives or process goals for each day of preparation.	4
Monitoring preparation and making adjustments to daily goals or objectives when required.	4
Assessing the facilities (e.g., training or practice facilities, supermarket etc.) available at the tournament course and in the local area, either prior to or upon arrival at the venue.	4
Planning and preparing meals for the tournament week and implementing a strategy for hydration that is appropriate for the climate of the venue.	4
Organising preparation so that practice activities are tapered or reduced leading up to the first round of competition.	4

Visualising the course layout and rehearsing the specific shots for each hole to ensure shot-practice is directed and purposeful.	4
Completing an individualised strength and conditioning program during the tournament week that may include a reduced or maintenance style of training and depend on the player's competitive schedule and the recommendations of the conditioning coach.	4
Monitoring physical (e.g., fatigue) and mental condition and using this feedback to adjust practice activities as required.	4
Evaluating preparation day-to-day and using this feedback to guide planning for further days of preparation.	4
Structuring pre-round technical or shot-practice to match the course conditions and hitting a variety of distances, clubs and shot types as per the player's course strategy.	4
Reflecting on the game plan and strategy for the course before each round.	4
Using a relatively consistent routine for AM and PM tee times that can be adapted depending on the time available (e.g., early AM tee times).	4
Using self-report computer software (e.g., ShotstoHole) programs or paper-based notes to record statistical information after each round.	4
Evaluating performance after each round at a technical, psychological, physical and tactical level and adjusting strategy as required.	4
Monitoring weather conditions and the state of the player's game day-to-day and using this information to adjust the strategy for the course as required.	4
Adjusting preparation for future tournaments based on the feedback and information gained from self-reflection and evaluation.	4
Completing a post-tournament debrief with the coach.	4
Performing a physical check to determine if an area of the body that may be the source of previous injury or concern requires more focus in the warm-up.	4

Recording self-reflection/evaluation after each round.	4
Practicing skills or shot-types that weren't performed well on the course, either post-round or prior the start of the next round.	4
Adjusting equipment set-up and bag configuration to match the playing conditions of the course.	4
Performing a debrief/evaluation with the caddie post-round.	4
Minimising practice drills during the tournament week that significantly change or alter the player's swing pattern.	4
Arriving to the tournament venue at least 3-4 days prior to the first round of competition for long-haul travel.	3.5
Developing a financial plan or budget for the tournament.	3
Using internet-based tools (e.g., Google maps) to familiarise themselves with the course layout and inform practice, as well as to develop a course guide.	3
Performing a debrief with the coach post-round to evaluate decision-making and discuss the positive aspects of their performance, while minimising technical evaluation or analysis.	3
Contacting the coach for advice following a poor performance.	3
Practicing skills or shot-types that were performed well on the course, either post-round or prior the start of the next round.	3
Setting outcome or scoring goals for the tournament.	3
Contacting a sports psychologist or practitioners for a post-round debrief.	3
Dedicating less time to course mapping and more to shot practice and if the player has experience playing the course and additional shot preparation is required.	2

Appendix 2

The interview guides for Study One for both players (i.e., Appendix 2a) and coaches, practitioners, and golf scientists (i.e., Appendix 2b).

Appendix 2a

Interview Guide - Players

Interview information

Location: _____

Date: _____

Length in min: _____

Introduction

Hello and thank you for taking the time to meet with me today. My name is Jarred Pilgrim and I am a PhD student from the Institute of Sport, Exercise and Active Living (ISEAL) at Victoria University. The purpose of this interview is to help me learn about how golfers prepare for a tournament.

The interview should take around 30 minutes to complete. Over the course of the interview I will be asking you a series of questions. Please keep in mind that there is no right or wrong way to answer these questions, so just answer to the best of your ability. If at any time you don't understand the question, just ask and I can repeat it or provide you with some further explanation.

With your permission I will be recording this session and also making some notes. Are you okay with this? All your responses will be kept confidential; this means that any information we include in our report will not identify you as a participant.

Do you have any questions about what I've just explained?

Are you willing to participate in this interview?

Background

M/F?

How old are you?

How long have you been playing golf?

What is your current handicap? (If applicable)

Are you a current member of a representative/developmental squad? If so, which squad?

Defining Tournament Preparation

First off, what does 'tournament preparation' mean to you? *(Probe for specific description and examples)*

What do you think is the goal of tournament preparation?

Do you think tournament preparation can influence your performance during a tournament? If so, how? *(Probe for specific examples)*

The pre-tournament period (i.e., the days leading up to a tournament)

Tournament arrival

As you know, a tournament in golf usually begins on a Thursday and concludes on a Sunday. When do you usually arrive at a tournament location?

When would be the ideal time to arrive at a tournament location if you had no other commitments or time constraints?

Travel

Most people are aware that golfers are often required to travel long distances to participate in major tournaments. How can this travel influence your performance?

Are there any particular methods or strategies that you use upon arrival to ensure you are able to perform at your best in the tournament? *(Probe using examples)*

Tournament preparation routine (be clear that routine is not referring to any type of pre-shot or preparation routine)

Do you have a specific tournament preparation routine that you follow in the days leading up to a tournament?

Do you plan or prepare this routine before a tournament?

What factors do you consider when planning or preparing this routine?

Do you set specific goals for each day of preparation? If Yes, do you evaluate or reflect on these goals and monitor your progress toward achieving them?

Do you alter your strategy or behaviour in preparation based on this feedback? Please explain.

Tournament preparation behaviours/strategies

Okay, now I'd like to discuss the specific behaviours or strategies that you use to prepare for a tournament.

First, I'd like you to talk me through your first day of preparation. That is, what are some of the behaviours or strategies that you engage in when you first arrive at the location of a tournament? *(Probe for specific examples)*

Now I'd like to discuss some of the strategies or behaviours that you use to prepare on further days of preparation before the tournament begins? *(Probe for specific examples)*

What factors (if any) can influence the behaviours that you undertake on these days of preparation? *(Probe for specific examples)*

The tournament period (i.e., the period before, between and after a round of competitive play)

Before a round of competitive play

Okay, now I would like to talk about how you prepare the day of a tournament round.

What are some of the specific strategies or behaviours that you use from the morning until immediately before you tee off?

How (if at all) do these behaviours change depending on whether you are teeing off in the AM or the PM?

Between rounds of competitive play

During a tournament, around 5-6 hours is spent on the course each day in each round of competitive play. In the period between these rounds, are these any specific strategies that you use to prepare for further rounds of play?

The post-tournament period (i.e., the period before, between and after competitive play)

Reflection

Do you evaluate or reflect on the effectiveness of your tournament preparation both following a round and at the end of a tournament?

If YES, please explain how you use this information?

Appendix 2b

Interview Guide – Coaches, practitioners and golf scientists

Interview information

Location: _____

Date: _____

Length in min: _____

Interview participant

☐ Coach
☐ Golf practitioner
☐ Golf scientist

Introduction

Hello and thank you for taking the time to meet with me today. My name is Jarred Pilgrim and I am a PhD student from the Institute of Sport, Exercise and Active Living (ISEAL) at Victoria University. The purpose of this interview is to help me learn about how golfers prepare for a tournament.

The interview should take around 30 minutes to complete. Over the course of the interview I will be asking you a series of questions. Please keep in mind that there is no right or wrong answer to these questions, so just answer to the best of your ability. If at any time you don't understand the question, just ask and I can repeat it or provide you with some further explanation.

With your permission I will be recording this session and also making some notes. Are you okay with this? All your responses will be kept confidential; this means that any information we include in our report will not identify you as a participant.

Do you have any questions about what I've just explained?

Are you willing to participate in this interview?

Background

M/F?

How old are you?

How long have you been in your current position of employment?

Defining tournament preparation

First off, what does 'tournament preparation' mean to you? *(Probe for specific description and examples)*

What do you think is the goal of tournament preparation?

Do you think tournament preparation can influence a golfer's performance during a tournament? If so, how? *(Probe for a description of what exactly is meant by performance…. i.e., score, position in field etc.)*

The pre-tournament period (i.e., the days leading up to a tournament)

Tournament arrival

As you know, a tournament in golf usually begins on a Thursday and concludes on a Sunday. When do you think a golfer should arrive at a tournament location? *(Probe for specific differences between skill/competitive levels)*

Travel

Most people are aware that golfers are often required to travel long distances to participate in major tournaments. Do you think this travel can affect their performance? If No, why? If Yes, how?

In this case, are there any particular methods or strategies that golfers can use upon arrival to ensure they can perform at their best in the tournament? *(Probe using examples)*

Tournament preparation routine

Do you think golfers should have a specific tournament preparation routine to follow in the days leading up to a tournament?

Should this routine be planned or prepared before a tournament?

What factors need to be considered when planning or preparing this routine?

Should this routine include specific goals for each day of preparation?

Tournament preparation behaviours/strategies

Okay, now I'd like to discuss the specific behaviours or strategies that golfers use to prepare for a tournament.

First, I'd like you to talk me through what you consider to be an optimal first day of preparation. That is, what are some of the behaviours or strategies that a golfer should be undertaking when they arrive at the location of a tournament? *(Probe for specific examples)*

Now I'd like to discuss some of the strategies or behaviours that you think are important for golfers on further days of preparation before the tournament begins? *(Probe for specific examples)*

What factors (if any) do you think can influence the behaviours that golfers undertake on these days of preparation? *(Probe for specific example)*

The tournament period (i.e., the period before, between and after competitive play)

Before a round of competitive play

Okay, now I would like to talk about how golfers prepare the day of a tournament round.

In your opinion, what are some of the specific behaviours and strategies that golfers should be undertaking from the morning until immediately before they tee off?

Should these behaviours or strategies change depending on whether the golfer is teeing off in the AM or PM? If so, how?

After a round of competitive play

During a tournament, around 5-6 hours is spent on the course each day in competitive play. In the period between these rounds, are there any specific strategies that golfers should use to prepare for further bouts of competitive play?

Do you think the golfer's performance within a round should influence how they prepare for the next round of play? If so, how? *(Probe for specific examples)*

The post-tournament period (i.e., the period before, between and after competitive play)

Reflection

Do you think a golfer should evaluate the effectiveness of their tournament preparation following each tournament performance?

If YES, please explain how you believe they should use this information?